

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



FIVE DOLLARS PER YEAR

AUGUST, 1952

FIFTY CENTS PER COPY

"For 20 Years, TEXACO DEPENDABLE DIESEL PERFORMANCE"

—Denton Smith,
Power Plant Superintendent,
Potash Company of America,
Carlsbad, New Mexico

Some twenty years ago, the Potash Company of America generated its electricity with only three Diesel engines — two of them lubricated with *Texaco Ursa Oil*. Today, this plant has eight Diesels and, because of superior performance over two decades, all of them are lubricated with *Texaco Ursa Oil*. Denton Smith, Power Plant Superintendent, thus speaks from experience when he says —

"*Texaco Ursa Oils* have done a real job for us in keeping our Diesels running clean, so that we've had a minimum of maintenance expense and very low fuel consumption over the years. This, plus the skilled lubrication engineering service rendered by The Texas Company, is the reason why we are using *Texaco Ursa Oils* exclusively today."

Texaco Ursa Oils have remarkable oxidation-resistance. Thus, they assure freedom from carbon and sludge formations . . . assure the free rings, clear ports and properly functioning valves that mean better compression and combustion . . . less fuel consumption . . . longer parts life and lower maintenance costs.

There is a complete line of *Texaco Ursa Oils* available to meet every requirement and approved by leading Diesel builders. Operators everywhere prefer them. In fact —

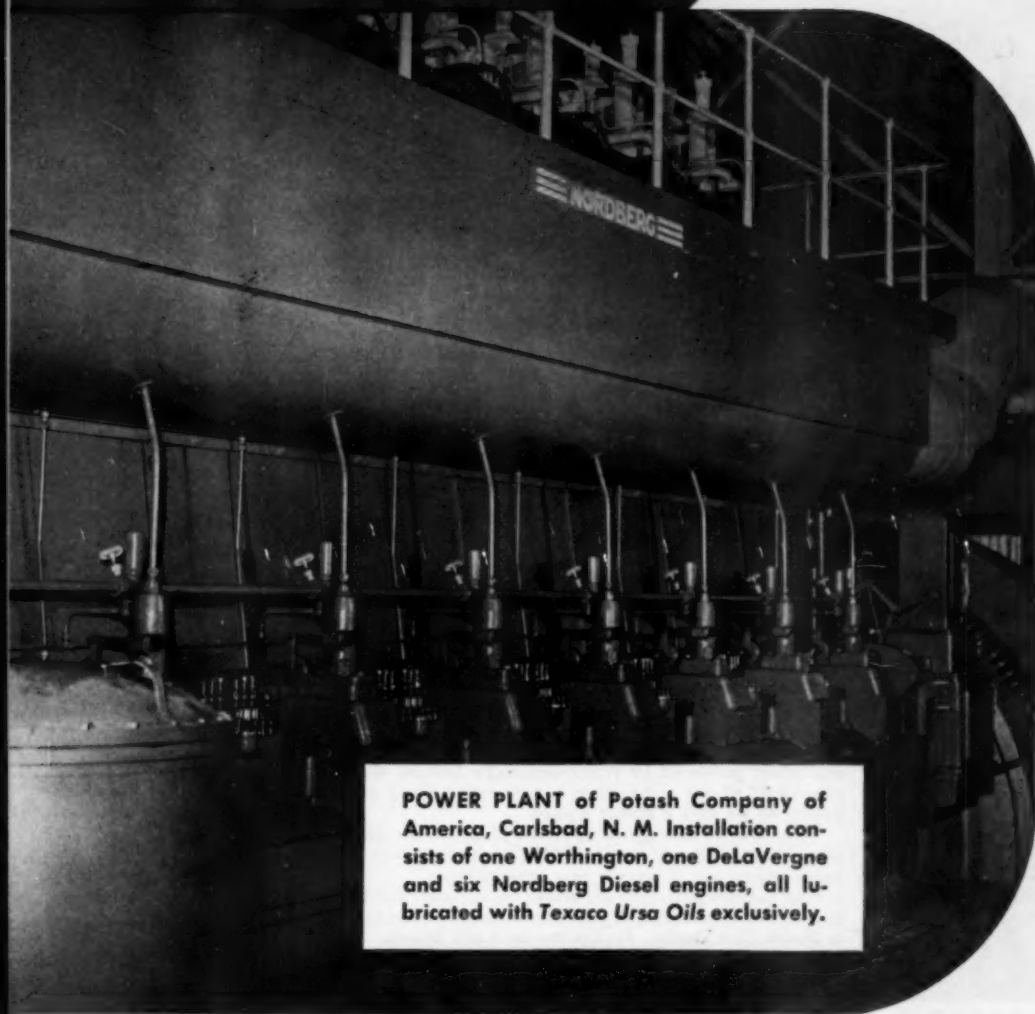
*For over 15 years, more stationary Diesel h.p. in the U. S.
has been lubricated with Texaco than with any other brand.*

Let a Texaco Lubrication Engineer help you step up the performance of your Diesels and bring down your costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO

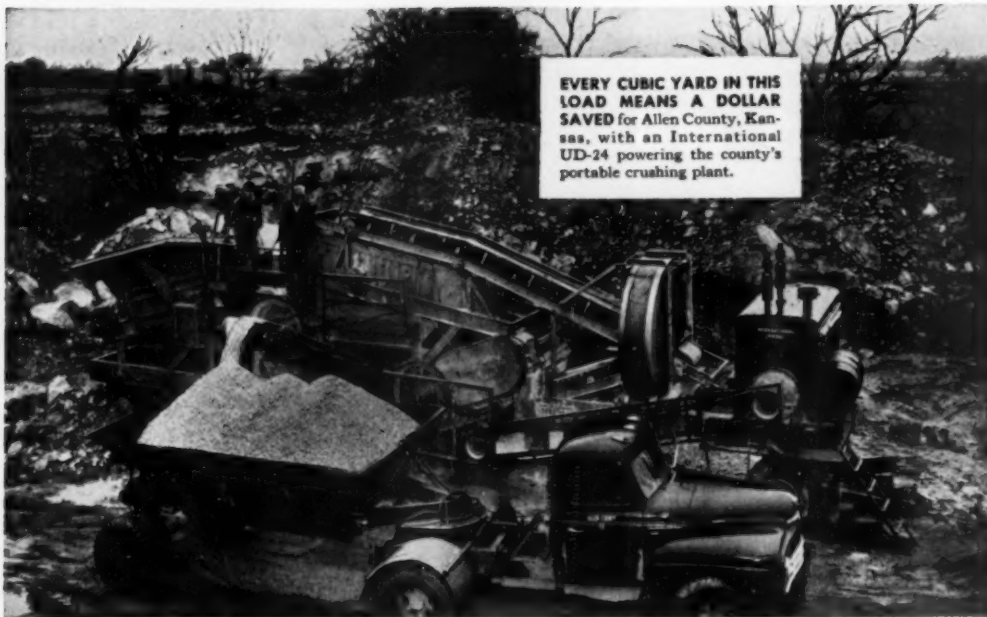
O has given us



POWER PLANT of Potash Company of America, Carlsbad, N. M. Installation consists of one Worthington, one DeLaVergne and six Nordberg Diesel engines, all lubricated with Texaco Ursa Oils exclusively.

URSA OILS FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES

Faithfully yours
50
for Fifty Years



EVERY CUBIC YARD IN THIS LOAD MEANS A DOLLAR SAVED for Allen County, Kansas, with an International UD-24 powering the county's portable crushing plant.

Allen County Saves a Dollar a Yard

Read how International helps pile up big savings in limestone quarry

Out in Allen County, Kansas, which boasts 60 limestone quarries, Superintendent of County Roads Roy Maple is saving tax dollars with an economical, International-powered portable crushing plant. Here is his report:

"In our first year of operation, production was over 65,000 cubic yards of crushed limestone at a cost of 40¢ a yard with our plant powered by International's UD-24. We had been paying \$1.40 per cubic yard before purchasing our portable plant, so we save a dollar a yard."

"Our UD-24 has given us more than a year and a half of service without any trouble. This crushing plant system has been one of our county's best investments."

Find out how International power can cut costs and boost output in your own operation. Call your International Industrial Distributor or Power Unit Dealer. He has the facts and figures.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS



"BEST INVESTMENT," is how Roy Maple (right) feels about his International UD-24.



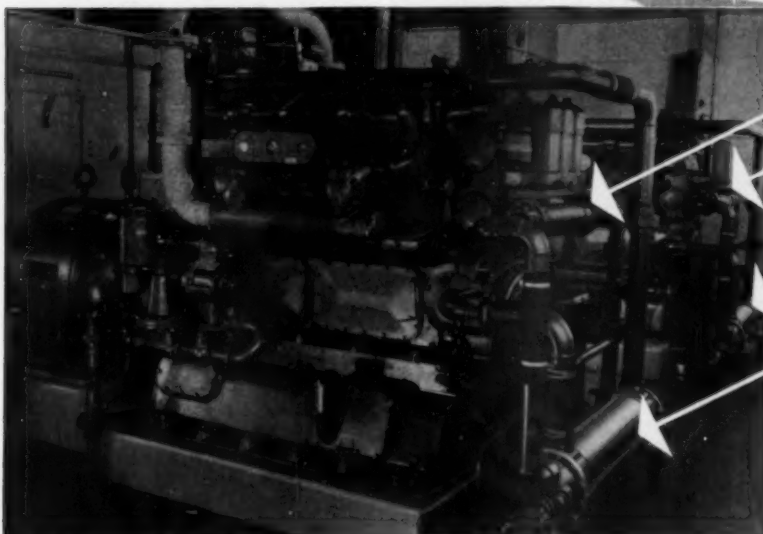
INTERNATIONAL

POWER THAT PAYS

in pumping station, oil field and pipeline operations

Ross Exchangers guard temperatures for CATERPILLAR diesels

REG. U. S. PAT. OFF.



In constant readiness to supply emergency standby power for the pumping station of a Michigan gas storage company, are these two Caterpillar D364 Diesel Electric Sets. Each is equipped with two Ross Type BCF Exchangers: One for the lube oil. The other for the cooling water.

Out in the oil fields, supplying power for drilling rigs—or on pipeline construction jobs, supplying power for ditchers—more Caterpillar Diesels are at work. And more Ross Exchangers are working with them!

In spite of the heavy responsibilities they're called upon to carry . . . in spite of the summer's heat or the wide range of stresses encountered . . . tough, dependable Caterpillar Diesels and tough, de-

pendable Ross Exchangers always measure up, *with plenty to spare!*

The sound engineering that distinguishes Caterpillar Diesels is the very basis of selecting so vital a component as an exchanger. *Oil and water temperatures must be right!*

And so it is that Ross Type BCF Exchangers are used so extensively, not only on Caterpillar Diesels, but on the vast majority of all other makes. Their skillfully pre-engineered design assures long, dependable performance. Their all-copper and copper alloy construction means durability. Their complete standardization and mass production simplify design problems, enable prompt availability.

Details in new Bulletin 1.1K5.

KEWANEE-ROSS CORPORATION

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1425 WEST AVENUE BUFFALO 13, N. Y.
In Canada, Horton Steel Works, Limited, Port Erie, Ont.



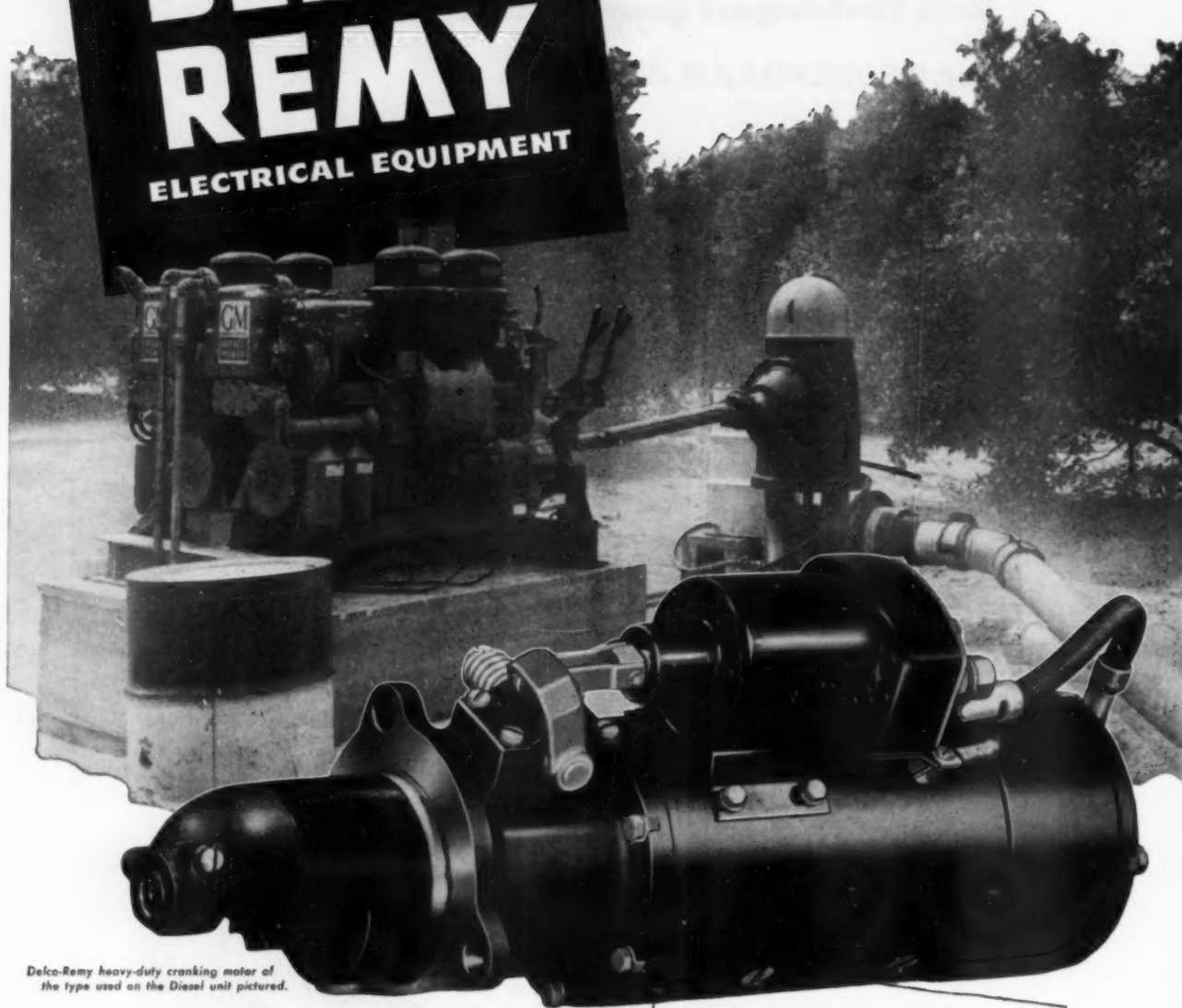
Serving home and industry

AMERICAN STANDARD - AMERICAN BLOWER - ACME CABINETS - CHURCH SEATS - DETROIT SUBSIDIARY - KEWANEE BAKERY - ROSS HEATER - TONAWANDA IRON

DELCO-REMY

ELECTRICAL EQUIPMENT

**SERVING THE DIESELS
THAT SERVE AMERICA**



Delco-Remy heavy-duty cranking motor of the type used on the Diesel unit pictured.

If there's a tough job to be done, there's a Delco-Remy-equipped Diesel engine to do it—dependably, efficiently.

For example, Diesel power is a prime favorite for heavy-duty pumping operations, as in this Florida citrus grove installation.

From the beginnings of modern Diesel power, Diesels and Delco-Remy have been "partners in progress" for ever better operation at lower cost.

DELCO-REMY ELECTRICAL EQUIPMENT
A GENERAL MOTORS PRODUCT

DISTRIBUTED BY WHOLESALERS EVERYWHERE

Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION
ANDERSON, INDIANA

DELCO-REMY • WHEREVER WHEELS TURN OR PROPELLERS SPIN

DIESEL PROGRESS



You, too, can depend on Harrison

Most Diesel engine manufacturers know that Harrison heat exchangers—oil coolers, water coolers—can be depended upon to do specific cooling jobs efficiently. They know that Harrison heat exchangers combine high capacity with compactness and durability.

The experience gained during years of designing and manufacturing heat transfer products of all kinds qualifies us to be of service to you. We welcome the opportunity to discuss your requirements.

HARRISON

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION
LOCKPORT, NEW YORK

NEW YORK CENTRAL "25" HAS SWITCHED TO GM DIESEL POWER



Originally powered with steam, the New York Central "25" has been converted to General Motors Diesel-Electric Drive propulsion machinery. With greater power, the "25" will prove to be a more efficient tug in the New York Harbor service.

No Substitute for Diesel-Electric Drive

CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS • CLEVELAND 11, OHIO



ENGINES FROM 150 to 2000 H.P.

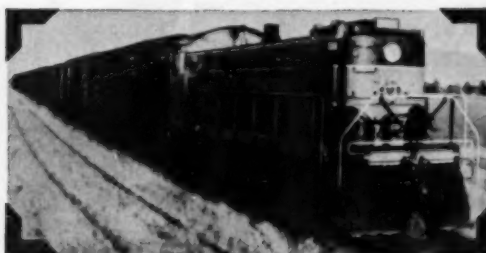
SALES AND SERVICE OFFICES

Cambridge, Mass. • Jacksonville, Fla. • Miami, Fla. • Montreal, P. Q. • New Orleans, La. • New York, N. Y. • Norfolk, Va. • Orange, Texas
San Francisco, Calif. • Seattle, Wash. • St. Louis, Mo. • Tampa, Fla. • Toronto, Ont. • Vancouver, B. C. • Washington, D. C. • Wilmington, Calif.

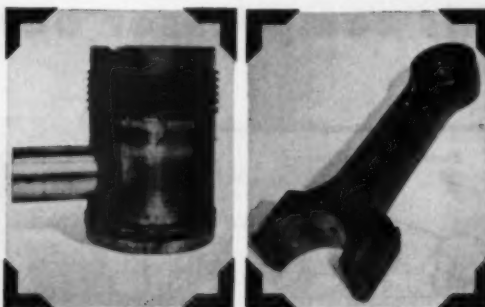
STANDARD ENGINEER'S REPORT

DATA
LUBRICANT *RPM DeLo Oil R.R.*
UNIT *Alco Diesel - 6 cyl. 12½" x 13" - 1000 H.P.*
SERVICE *Mountain haul - Heavy snow, extreme cold*
LOCATION *Spokane, Wash. - Yahk B.C.*
FIRM *Spokane International R.R. Co.*

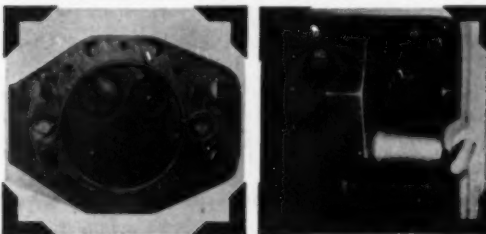
Engines in "perfect condition" after year of toughest service!



LUBRICATED WITH RPM DELO Oil R.R., nine new diesels owned by the Spokane International R.R. Company were kept in regular service for one year. The winter was exceptionally severe and the locomotives bucked heavy snow almost daily. They worked or were idled in temperatures that often for periods of ten days averaged from 20 to 40 degrees below zero.



On inspection at the end of that time there were no accumulations of sludge in oil systems and the engines were in "perfect condition" as pictures of parts from one of them indicate.



NO CARBON had collected on the cylinder head and all rings were free and functioning properly. Connecting-rod and main bearings and wristpin were within standard tolerance. Measurement of the liner showed less than 0.001 inch wear.

REMARKS: The Spokane International Railroad provides an important connecting service between transcontinental lines through Spokane and the Canadian Pacific to the north. Most of their trackage is in northern Idaho where severe weather and other conditions often make operation difficult. RPM DELO Oil R.R. will meet the toughest weather or operational conditions in all locomotive diesel engines.



How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



- A. Special additive provides metal-adhesion qualities... keeps oil on parts whether hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer... prevents ring-sticking. Detergent keeps parts clean... helps prevent scuffing of cylinder walls.
- C. Special compounds stop corrosion of bushing or bearing metals and foaming in crankcase.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco

STANDARD OIL COMPANY OF TEXAS • El Paso, Texas

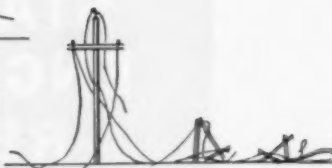
THE CALIFORNIA OIL COMPANY • Barber, N. J., Chicago, New Orleans

THE CALIFORNIA COMPANY • Denver, Colorado

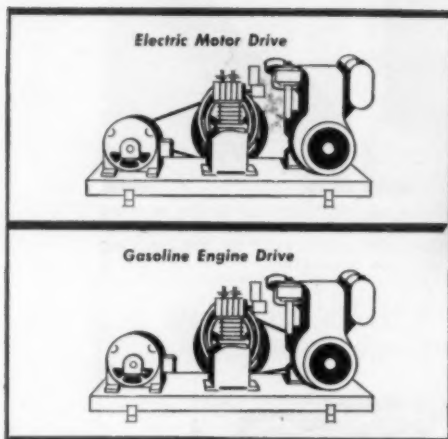
Wires Up!



or Wires Down!



**... you'll have starting air on tap
with this compressor outfit**



Both electric motor and gasoline engine drive are furnished with this Gardner-Denver ADD Compressor combination. Normally, you'll use the electric motor—but whenever power emergencies come along, you can simply switch the V-belt drive to the gasoline engine, and still have the air you need for diesel engine

starting. This combination is ideal, too, for the portable diesel rig that's sometimes set up beyond the reach of power lines.

Write today for full information on this and other quality Gardner-Denver Air Compressors for engine starting service.

GARDNER-DENVER

SINCE 1859

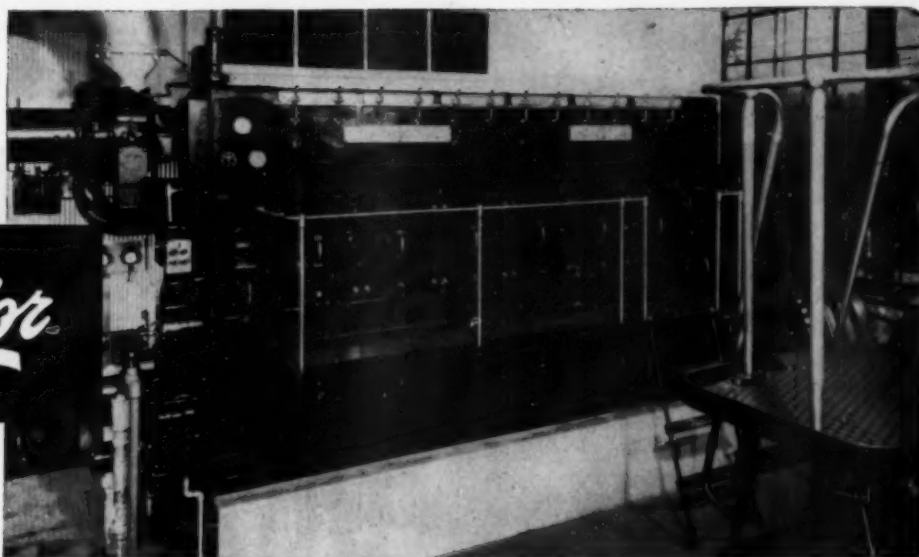
Gardner-Denver Company, Quincy, Illinois

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

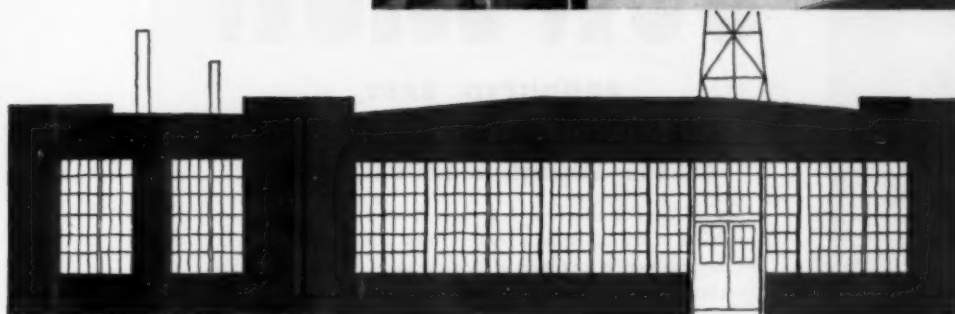
this

Superior

diesel



A Model 60 supercharged SUPERIOR Diesel, developing 695 h.p. at 450 r.p.m., in Stryker plant. Consulting Engineers for this installation were Carl J. Simon and Associates, Van Wert, Ohio.



carries the major load and increases plant efficiency for **STRYKER, OHIO**

Since it was installed in 1948, this supercharged, 4-cycle SUPERIOR Diesel has carried the major power load for all residential and industrial demands in Stryker, Ohio. Installed at a time when peak loads and power demands were steadily increasing, this SUPERIOR engine immediately took the primary load, leaving other engines which were formerly main power sources available for auxiliary and emergency service.

The peak load for Stryker, a community with a population of 1,000, is approximately 500 KW, and the average load is 325 KW. Operating with a 45% load factor, the SUPERIOR easily carries this with power to spare.

Operating with the other engines, the SUPERIOR increased the plant average of KWH per gallon over previous records. Charles Scheer, Stryker plant superintendent, states that this SUPERIOR "has not caused one service interruption since installation, and has given excellent performance with maintenance costs practically negligible."

Economy, dependability, and low maintenance costs are just three features that have built the proved performance records of SUPERIOR and ATLAS engines in power generation throughout the country. For more information and details of other plus advantages, write The Engine Division, Springfield, Ohio.



ENGINE DIVISION

THE NATIONAL SUPPLY COMPANY

PLANT AND GENERAL OFFICES:

SPRINGFIELD, OHIO

SALES AND SERVICE POINTS:

Gloucester, Massachusetts
Houston • Fort Worth, Texas
San Diego • Oakland
Terminal Island, California
Ketchikan, Alaska • Lincoln, Neb.
Ames, Iowa
Kansas City, Mo.
Portland • Astoria, Oregon
Hullus, Nova Scotia
Vancouver, B.C. • Washington, D.C.
Park Rapids, Minnesota
New York • Seattle • New Orleans



HUNT-SPILLER GUN IRON

PRODUCED, CAST, ACCURATELY MACHINED FOR TODAY'S DIESEL ENGINE WEARING PARTS

Just as Air Furnace Gun Iron was the answer for ordnance products of the nineteenth century, today it overcomes many of the engineering problems of modern diesel engines. Its dense pearlitic structure provides exceptional resistance to frictional wear . . . extreme pressure . . . high heat . . . corrosion and erosion—assuring diesel parts that are high in service life, low in service cost.

Of primary importance, the quality of parts such as those illustrated is completely controlled from furnace to finished product. Not only does Hunt-Spiller produce Gun Iron in its own air furnaces and cast it in its modern foundry but here also is every facility for complete machining to the closest tolerances required for diesel parts.

That's why, when you see the letters "HSGI" on a diesel part, you will know it is one of tens of thousands of such parts contributing today to more efficient, economical diesel performance.

War of 1812 . . .

Hunt-Spiller is a direct descendant of the famous Alger Foundry established in South Boston in 1810. In the original foundry buildings pictured here, cannon balls were produced for the War of 1812. In following years, Air Furnace Gun Iron became the accepted material for cannon production—hence the term "Gun Iron."



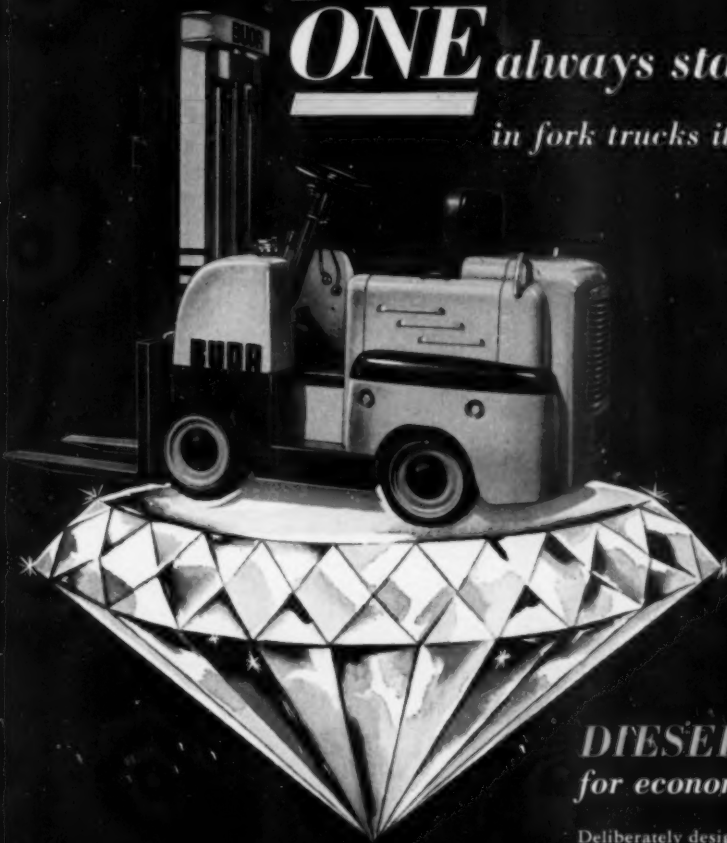
HUNT • SPILLER

MANUFACTURING CORPORATION

387 DORCHESTER AVENUE • SOUTH BOSTON 27, MASS.

Canadian Representatives: Joseph Robb & Co., Ltd., 4050 Namur St., Montreal 16, P. Q.

ONE always stands out!
in fork trucks it's BUDA



**DIESEL Powered
for economy**

Deliberately designed "years ahead" to give you more style, performance and operating economy, the new Budas are as beautiful as they're tough... as brilliant as they're efficient. Packed with more than 50 exclusive functional design features and powered by *our own* million-hour proved Buda Industrial Type Diesel or gasoline engines, Buda "FT" Series Fork Trucks are truly "tomorrow's trucks today."

See them at your Buda Distributor now. Write for Bulletin 1576 and complete details today. The Buda Company, Harvey, Illinois



THE LINE WITH ALL 3 FOR DIVERSIFIED HANDLING

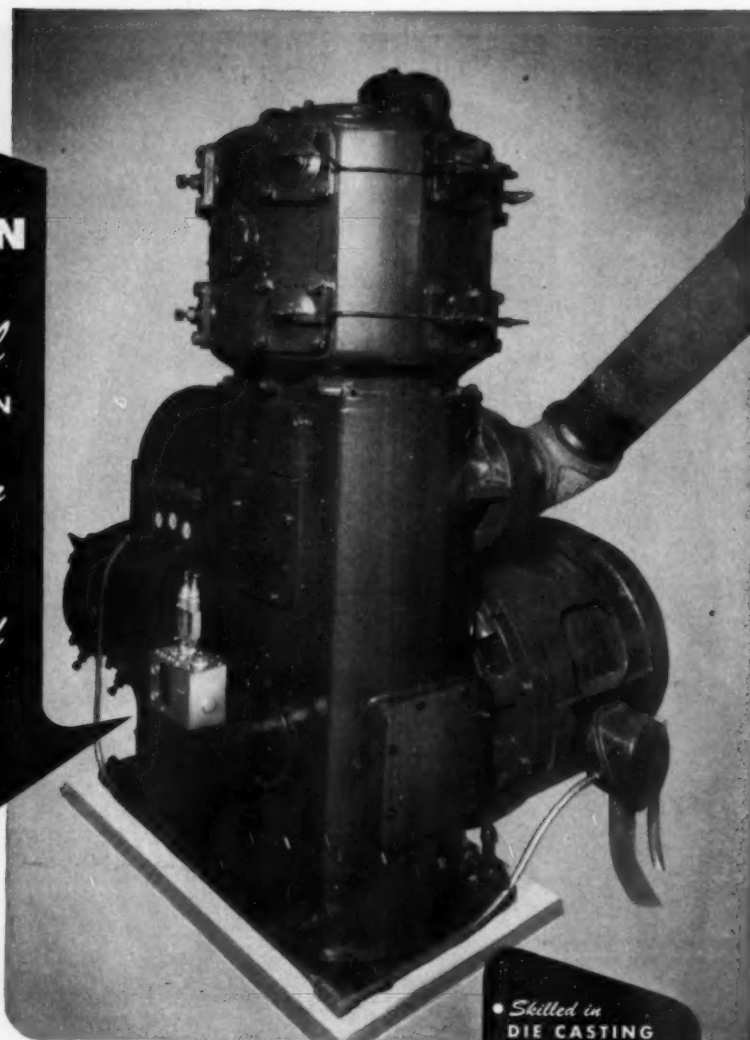
BUDA

BH-41

**MADISON
-KIPP**
fresh oil
LUBRICATION

*fed under
pressure
by the
measured
drop!*

*Illustrated, the
Madison-Kipp Model
SVH Lubricator
on an Ingersoll-Rand
XLE Compressor.*



**.... STANDARD EQUIPMENT ON COMPRESSORS,
WORK ENGINES AND MACHINE TOOLS....**

Oil under pressure fed drop by drop from a Madison-Kipp Lubricator will definitely increase the production potential for years to come when applied as original equipment on new machine tools, work engines and compressors. There are six popular models for every application. Write for special engineering data for your particular requirement.

- *Skilled in
DIE CASTING
Mechanics*
- *Originators of
Really High Speed
AIR TOOLS*
- *Experienced in
LUBRICATION
Engineering*

MADISON-KIPP CORPORATION

215 WAUBESA STREET, MADISON 10, WIS., U.S.A.

ANCIENS ATELIERS GASQUY, 31 Rue du Marais, Brussels, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.

USCGC *Courier* heads for foreign service

with her "CARGO OF TRUTH"



HERE is the new Coast Guard manned Voice of America ship, the USCGC *COURIER*, destined for foreign service with a most valuable cargo—*TRUTH*. Virtually a sea-going radio broadcasting station, she will relay Voice of America signals directly into countries behind the Iron Curtain.

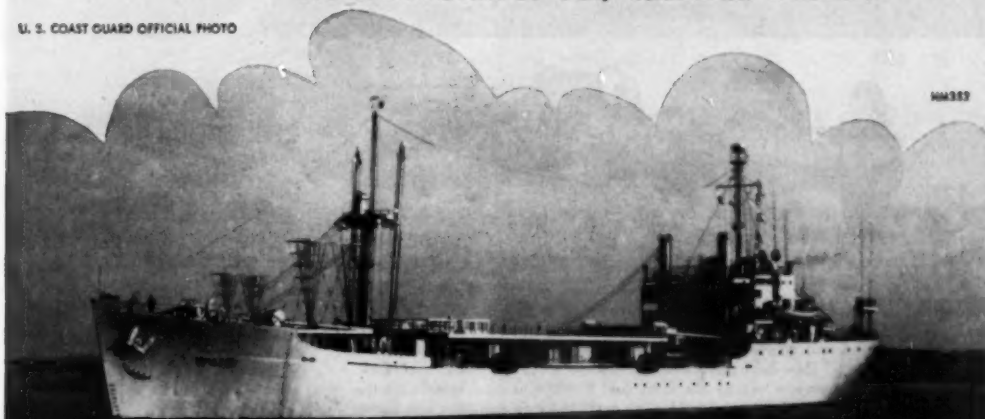
This floating transmitter was developed under a State Department project known as "*Operation Vagabond*", approved by the President and the Joint Chiefs of Staff, to provide maximum mobility and 24-hour, all-weather operation. The ability of the vessel to shift operational areas as required, or to remain in one place as long as needed, was an essential factor in planning the project.

To provide dependable main propulsion under widely varied operating conditions, this 336-ft., 5800-ton vessel is powered with a single six-cylinder NORDBERG Diesel Engine rated 1700 normal shaft horsepower at 180 rpm, directly connected to the propeller shaft.

This is another good example of the way in which NORDBERG Diesels, in sizes from 10 to more than 10,000 horsepower, are being used for main propulsion and auxiliary marine service on vessels operating in practically every corner of the globe.

NORDBERG MFG. CO., Milwaukee, Wisconsin

U. S. COAST GUARD OFFICIAL PHOTO



NORDBERG

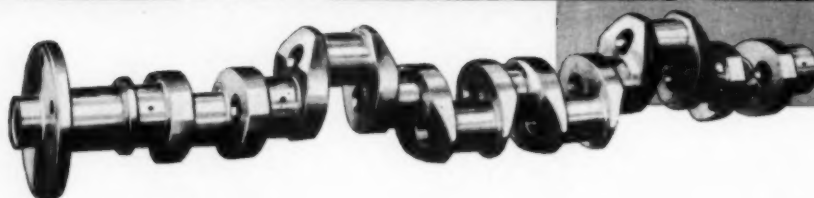


DIESEL and GASOLINE ENGINES

TONS OF STEEL...

precisely machined—

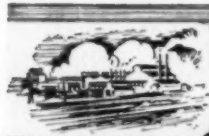
ERIE CRANKS AND SHAFTS



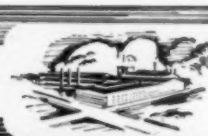
Here are tons of Carbon and Alloy Steel, precisely machined for a variety of applications. Shown is one of the three quarter mile long bays in our plant, all of which are devoted to careful machining operations on shafting, crankshafts and connecting rods.

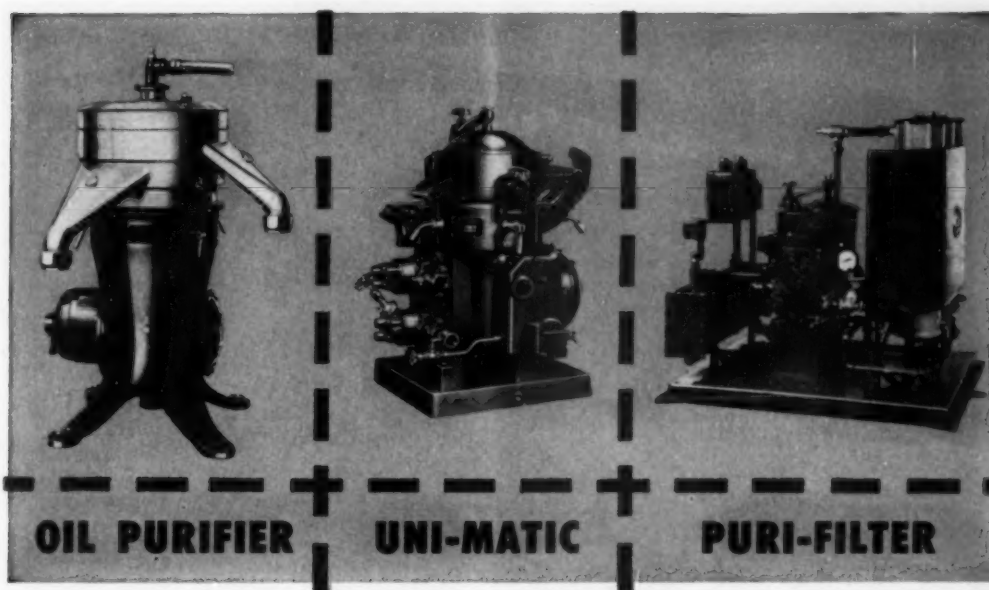
Here the finest machines combine with experienced craftsmen to produce exactly the right part finished to rigid specifications.

The experience of many years in every operation from ingot to finished crank is available here at Erie. Consult with us on your next crankshaft, shafting or connecting rod requirements.



ERIE FORGE & STEEL CORPORATION
ERIE, PENNSYLVANIA





WHICH ONE ?

De Laval Oil Purifiers are supplied in types and sizes for every plant need. All types . . . straight Oil Purifier . . . "Uni-Matic" Oil Purifier . . . or "Puri-Filter" . . . perform the same basic function equally well—they all throw out of the oil by means of centrifugal force, all solid and liquid impurities. But each machine has its place.

The straight Oil Purifier is used where it is desirable to install separate pumps to carry the oil to and from the purifier. This type of De Laval machine comes in the widest range of capacities, from 5 gph to 1800 gph dependent on the viscosity of the oil being purified.

The "Uni-Matic" is built with its own pumps. When necessary, a heater is also supplied. It is ready to operate as soon as it is piped up to the oil supply.

The "Puri-Filter" is a complete De Laval "Uni-Matic" plus a set of three or more filters. The filters remove colloidal carbon and other minute contaminants that get into diesel oil, or remove fly ash from turbine oil. Because it combines centrifugal force and micron filtration, it leaves oil visibly clean—practically transparent. Its capacity depends on that of its basic unit—the De Laval "Uni-Matic" Oil Purifier.

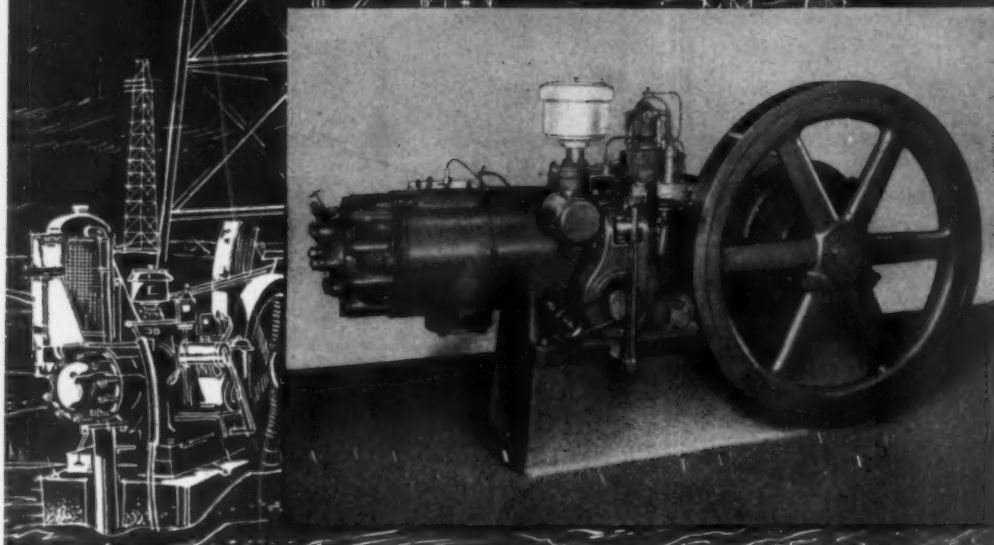


THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

DE LAVAL OIL PURIFIERS
FOR MORE DEPENDABLE POWER PRODUCTION

Now available up to 55 HP...

LORAIN ENGINES



Pickering governor, Air Maze oil-bath cleaner, McCord lubricator and Lorain gasoline starter standard; Twin Disc clutch optional.

Two famous names—Oilwell and Lorain—combine to bring you a line of rugged oil field engines ranging from 10.7 to 55 HP.

Latest model, and largest in the line, is this husky Lorain Model DA cold-starting full diesel which can be converted in the field to gas operation. Radiator-type system assures adequate cooling under all loads. The Lorain Model DA features tapered roller bearings for crankshaft and auxiliary shafts. A wet sleeve cylinder of alloy cast iron assures long life and easy replacement with minimum downtime.

For dependable, low-cost power rely on Lorain Engines. Ask your Oilwell representative for full details or write for literature.

CONDENSED SPECIFICATIONS

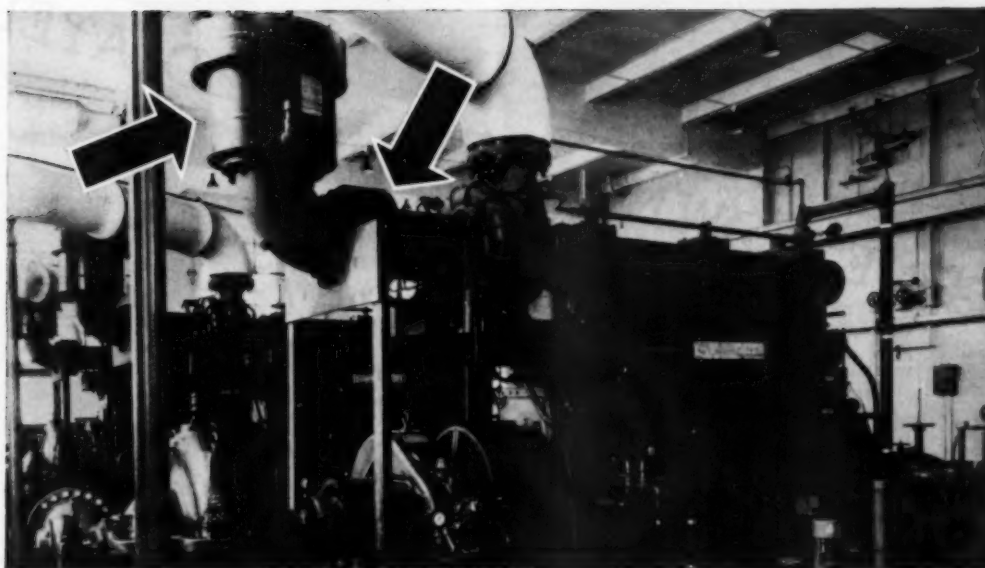
Lorain Engine	Type L	Type G	Type R	Type A	Type DA
Bore	7½"	9½"	12"	13"	13"
Stroke	8"	10"	13"	13"	13"
Speed Range RPM	300—400	240—450	185—300	185—325	185—325
Rated Horsepower	10.7—21.4	17.2—32	27—40	32—55	32—55
Overall Height	53"	59"	68"	68"	60"
Overall Length	72"	88"	110"	110"	117"
Overall Width	48"	58"	72"	74"	55"
Approx. Ship. Wt.	2600 lbs.	3800 lbs.	8000 lbs.	8200 lbs.	9050 lbs.

A-5412

WHITE-ROTH

Machine Corp.

LORAIN, OHIO



Idlewild Airport's Superior diesels have air scrubbed clean, noise muffled by Air-Maze air filters and silencers

THESE SUPERIOR DIESELS on the job at the fire pumping station, Idlewild Airport, get dirt-free air and quieter operation from the Air-Maze oil-bath air filters and inline silencers on the air intakes. And space is saved because Air-Maze filters and silencers are more compact, provide maximum performance in minimum space.

Design of Air-Maze oil-bath filters causes turbulent scrubbing of intake air by oil removing most of the dirt particles. The air then passes through an oil washed filter element which filters out remaining particles and all entrained oil. Engine gets only clean air, preventing damage to the highly polished pistons, liners and rings.

Air-Maze oil-bath filters can be obtained in either top or bottom outlet models, with or without relief valves or backfire valves. They are serviced by merely draining and refilling with oil, but may be completely disassembled whenever necessary.

Leading diesel engine manufacturers specify Air-Maze oil-bath filters, inline silencers and many other types of air and liquid filters on original equipment. For more information, write Air-Maze Corporation, Cleveland 5, Ohio.

A FEW OF THE POWER PLANTS USING DIESELS PROTECTED BY AIR-MAZE FILTERS

City of Tonkawa, Okla.	Arizona Edison, Ajo, Ariz.
Caldwell Electric Light Plant, Caldwell, Ohio	Aspinwall Municipal Light Plant, Aspinwall, Pa.
City Power Plant, Malden, Missouri	Bemis Bag Company, Talladega, Alabama
Municipal Light Plant, Paxton, Nebraska	Town of Laurens, Iowa

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE
THE FILTER ENGINEERS

LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS



**...and the very same day
the cylinder head was on its way!**

When extended down-time means a serious business loss, call or wire Guth-Pascoe. No waiting days or even weeks for parts. Guth-Pascoe offers you immediate exchange service on most popular diesel engine heads . . . fully reconditioned, completely guaranteed, ready for instant shipment by the fastest means possible. You get full credit for your old cylinder heads upon its return. You pay only the cost of restoration and shipping.

All your cracked or broken castings, engine blocks and heads can be restored to factory-new service and performance by the Guth Fusion Process . . . and its operation will be

guaranteed. Its application is not limited to cast iron. All ferrous metal and many non-ferrous metal castings (including aluminum) can be restored to as-new condition the Guth-Pascoe way, no matter how badly damaged.

The GUTH FUSION PROCESS is a scientific system of rebuilding broken and cracked castings. Developed and patented in many of its phases by Carl A. Guth, its use is supervised every step of the way by Mr. Guth and his partner, A. H. Pascoe. Their 69 combined years of experience are the foundation for Guth-Pascoe's guarantee of *complete satisfaction*.

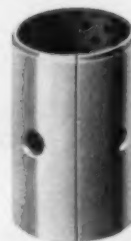
Guth-Pascoe Company

1933 EAST WASHINGTON STREET • PHOENIX, ARIZONA • PHONE 4-0391

EMERGENCY

RUSH SERVICE DAY OR NIGHT — SUNDAYS AND HOLIDAYS INCLUDED

Bearing performance with
Rolled Bushing Economy when
you use our Bimetal Bushings



Research, engineering and quality control departments to assist you. Specialized, large-run production facilities. Capacity now available!

- 1 BEARING MATERIALS**
Bronze, babbitt or copper-lead lining.
- 2 LOAD-CARRYING STRENGTH**
Lining materials bonded to steel backs.
- 3 LOW-COST PRODUCTION**
Rolled from bimetal continuous strip.
- 4 SPECIAL DESIGN FEATURES**
Oil pockets, grooves, holes, notches, windows, cut-outs; V-, lock- or straight butt-seam, etc.



Since 1899

FEDERAL-MOGUL

Products of our six plants include: Sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bi-metallic rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.

FEDERAL-MOGUL CORPORATION, 11039 SHOEMAKER, DETROIT 13, MICH.



*"... an expression of faith
in the intrinsic soundness
of our country."*

GEORGE C. BRAINARD

President, Addressograph-Multigraph Corporation

"The purchase of United States Savings Bonds is an expression of faith in the intrinsic soundness of our country, and indicates foresightedness with respect to one's own future needs. Since the inception of the Payroll Savings Plan by Addressograph-Multigraph Corporation in 1942, a large percentage of employees have continuously availed themselves of this safe and convenient method of providing for later benefits."

Every payday nearly seven million men and women—among them a large percentage of Addressograph-Multigraph employees—give substantial expression of their faith in America by putting \$140,000,000 into U.S. Defense Bonds.

These seven million payroll savers are not only backing up our country's defense effort—they are providing for their own security . . . helping to combat inflationary pressures . . . and building a reservoir of future purchasing power. How big is the reservoir? On December 31, 1951, the cash value of Series E Bonds outstanding was \$34,727,000,000—\$4.8 billions more than the cash value of Series E's outstanding in August, 1945.

Payroll savers are serious savers. Since May, 1951, through April, 1952, E Bonds maturing totaled \$2,345,000,000. But, only \$593,000,000 of these matured bonds have been presented for payment. 75% of these matured bonds are still held by their purchasers.

As President of one of the first companies to install the Payroll Savings Plan when it was presented to industry in 1942, Mr. Brainard also appreciates the benefits that accrue to a company that has a Payroll Savings Plan with more than 60% employee participation. In company after company, absenteeism has gone down, the accident rate has fallen off and production has gone up as employee participation passed the 60% mark.

What is the percentage of your employee participation? If it is less than 60%, get in touch with the Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D.C. Your State Director (listed in telephone books under "Savings Bond Division" as well as "U.S. Treasury Department") will be glad to show you how easy it is to reach 60%, 70%, or higher through a simple person-to-person canvass that puts a Payroll Savings Plan Application Blank in the hands of every employee. Phone, wire or write today.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and



Rex H. T. Admire

Editor—DIESEL PROGRESS



HAULING OUT THE HEAVYWEIGHTS . . . another tough job that demands **AMERICAN BOSCH** performance

Hustling out the big butts is a mighty tough job — but giant Diesel logging trucks take it in stride. These heavyweight haulers rumble over specially-built logging roads, daily shouldering loads that may scale fifty tons or more. Plenty of dependable power's a "must" — and that's why American Bosch products are on the job.

Reliable, precise fuel injection is one big reason for the sweeping success of the modern Diesel engine. And American Bosch has long been the leading supplier of fuel injection systems to Diesel engine man-

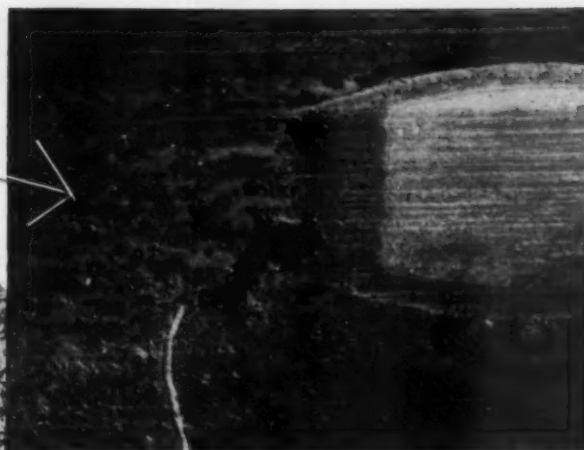
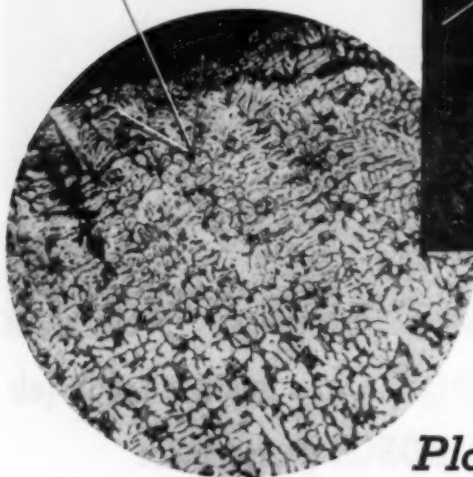
ufacturers. That's because American Bosch Diesel injection pumps and nozzles — although built to amazingly fine tolerances — provide long-lived, economical performance in the severest service.

For over forty years, American Bosch has maintained a unique reputation for advanced design, precision manufacture and widespread, thorough service. Continuous research in the automotive, aviation and Diesel fields helps to keep it that way. American Bosch Corporation, Springfield 7, Massachusetts.

AMERICAN BOSCH



*Don't let this happen
to your Diesel bearings!*



(Above) Photograph of surface of corroded copper-lead Diesel engine bearing. (Left) Photomicrograph of section through same bearing, showing loss of lead on the bearing surface after attack by corrosive elements. Note how the copper (white areas) is beginning to crumble. Lead is shown in gray.

Play safe with
GULF DIESELMOTIVE OIL
*-it's noncorrosive to copper-lead
and silver bearings*

In millions of miles of service, Gulf Dieselmotive Oil has proved to be noncorrosive to both copper-lead and silver bearings. There are several good reasons for this kind of performance: first, Gulf Dieselmotive Oil is made from a high quality base stock; second, it's 100% solvent refined; and third, it contains the right combination and concentration of additives. As a result, this quality lubricant is not corrosive, even after long periods of service.

If you want to avoid troubles like that pictured above, switch to Gulf Dieselmotive Oil. For further information, write, wire, or phone your nearest Gulf office.

GULF OIL CORPORATION
GULF REFINING COMPANY
PITTSBURGH 30, PA.



DIESEL and GAS ENGINE PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

REX W. WADMAN *Editor and Publisher*
SIDNEY HOFFMAN *Assistant Editor*
CHARLES F. A. MANN *Associate Editor*
WILBUR W. YOUNG *Vice President*
DORIS N. O'HARA *Production Manager*
PEGGY R. TOMACK *Mgr. Reader Service*

CCA

CONTENTS FOR AUGUST, 1952

Vermillion, South Dakota.....	25
Power Along the Alaskan Highway.....	28
Gene C. Hutchinson.....	30
Mesabi Range.....	32
Diesels in the Muskegs.....	34
Las Animas, Colorado.....	37
Milwaukee Railroad New Type Road Switcher.....	40
Phillips Pipe Line.....	42
Grand Forks, North Dakota, REA.....	48
What's Going On In England.....	52

DIESEL PROGRESS for August, 1952, Vol. XVIII, No. 8. Published Monthly by Diesel Engines, Inc., 816 N. La Cienega Blvd., Los Angeles 46, California. Tel. BRadshaw 2-6273. Subscription rates are \$5.00 for U.S.A. and possessions. All other countries \$7.50 per year. Subscriptions may be paid the London office at £2-12-6d per year.

DIESEL PROGRESS is indexed regularly by Engineering Index, Inc.

EDITORIAL AND PRODUCTION OFFICES

816 N. La Cienega Blvd.

Los Angeles 46, Calif.

NEW YORK 36:
Wilbur W. Young
2 West 45th Street
Murray Hill 2-7333

BUSINESS OFFICES

LOS ANGELES 46:
Sidney Hoffman
816 N. La Cienega Blvd.
BRadshaw 2-6273

LONDON E.C. 4:
G. L. Featherstonhaugh
St. Paul's Corner
Ludgate Hill

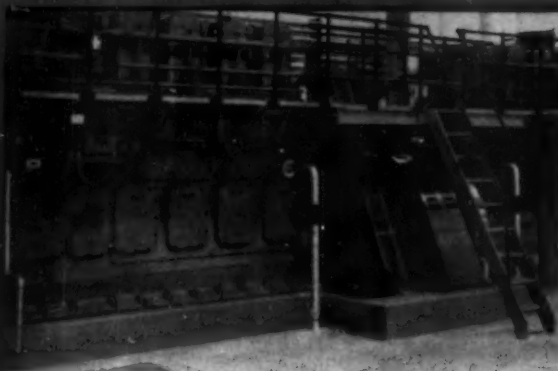
TULSA 3:
O. F. Cozier
515 McBirney Bldg.
4-5555



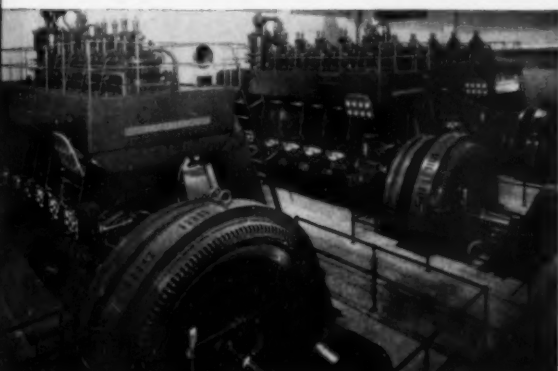
FRONT COVER ILLUSTRATION

Boat—120 ft. 6 in. by 38 ft. 6 in. by 6 ft., designed and built by Defoe Shipbuilding Co. of Bay City, Michigan, equipped with four General Motors Detroit diesels, owned by C. Russell Feldman of Honey Motor Co. of New York City.

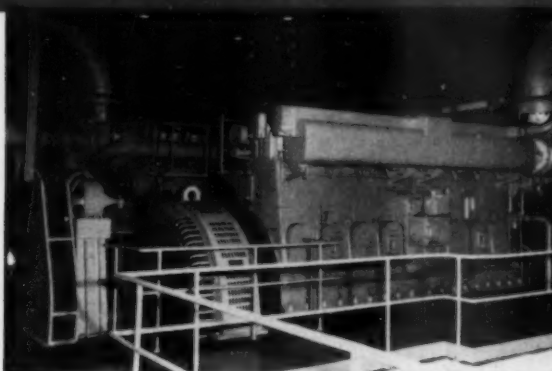
—Photo by Russell



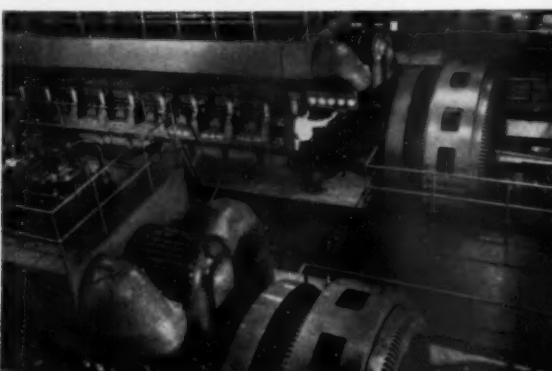
1



2



3



4

Four more tough power problems solved with Westinghouse A-C Generators

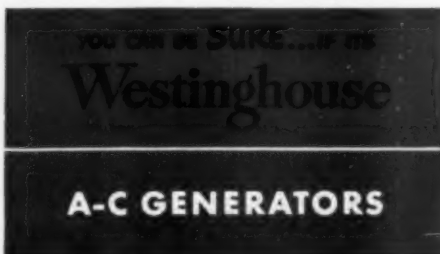
1 When Westinghouse was asked to sandwich an a-c generator in between two big twin diesels, an unusual application problem developed. One question was—how to insulate against the flow of shaft currents. Westinghouse engineers came up with a special coupling insulation that paved the way for future installations of this type.

2 Starting 1,000-hp motors at a large western cement plant puts a heavy load on ordinary generators... causes considerable voltage drop. Power plant specifications called for a minimum voltage drop. Westinghouse engineers solved the problem with the special generators pictured above—typical of the problem-solving ability offered by Westinghouse.

3 Cooper-Bessemer, called on to install a gas-diesel, engine-driven generator at the Yuma, Arizona plant of the Arizona Edison Company, selected the generator that could match the full-load, around-the-clock performance of the 16-cylinder, gas-diesel engine. They chose Westinghouse.

4 At the Langley Aeronautical Laboratory of the National Advisory Committee for Aeronautics, the problem was to supply supplementary power at peak loads to operate the large wind tunnels, and stand-by power to serve the general research needs. Four Westinghouse 6,600-volt, 2,500-kw, a-c generators have been successfully meeting these demands for the past ten years.

What about your tough power problems? Call your Westinghouse representative and let him help you arrive at the best solution. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-10381



DIESEL PROGRESS

VERMILLION, SOUTH DAKOTA

Converts Worthington Diesel to Dual-Fuel Operation, Raising Plant Capacity and Slashing Fuel Costs.

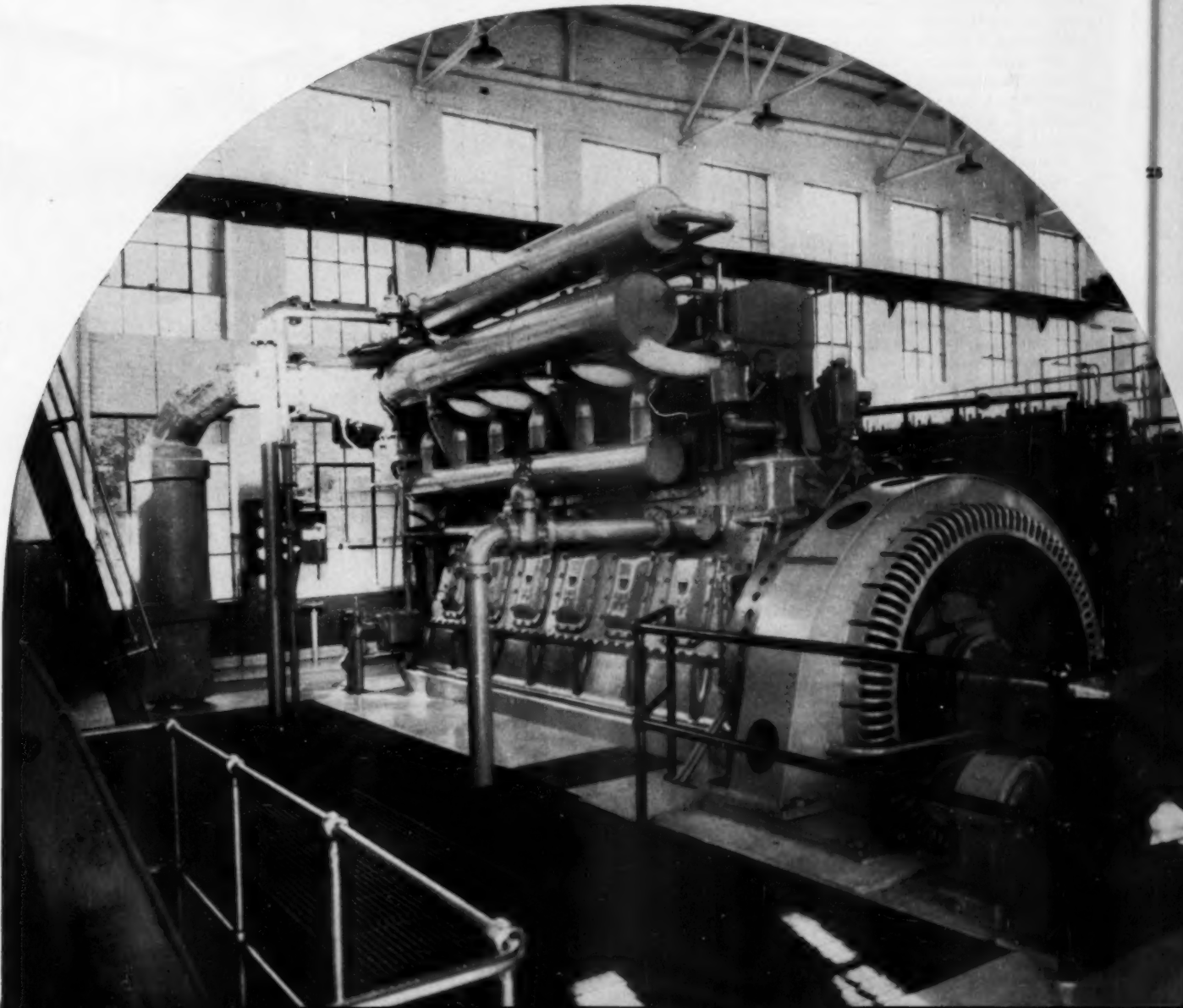
AFTER 50,000 hours of service, a 750-hp. Worthington diesel in the Vermillion, S.D., municipal power plant has been modernized, supercharged and converted to dual-fuel operation. The result has been a 60 percent increase in engine capacity and a 57 percent reduction in fuel costs. The unit was installed originally in 1937, a four-cycle, six-cylinder mechanical-injection diesel of 16-in. bore and 20-in. stroke, turning the shaft at 327 rpm. to develop the rated 750 hp. This engine

supplemented two 525-hp., two-cycle Fairbanks-Morse diesels which had been installed in 1932 when the plant switched over from steam to diesel. In 1947, progressive plant management put in one of the first dual-fuel engines in the region, an 8-cylinder, $17\frac{1}{2} \times 24\frac{1}{2}$ -in., four-cycle Fulton, rated at 1300 hp. at 277 rpm.

With the price of fuel oil rising steadily, it became desirable to shift as much of the load as possible

to natural gas fuel. At the same time, sound power policy demanded an increase in firm generating capacity. The most economical means of accomplishing both these objectives was found to be the conversion of the Worthington diesel. Consequently, in the Winter of 1949-1950, the engine was rebuilt. An exhaust turbocharger, oil-cooled pistons, a new governor, and dual-fuel parts were installed. With speed raised to 360 rpm., the engine was now capable of developing 1200 hp., an in-

This view shows the exhaust side of the Worthington engine which has saved more than \$10,000 in fuel costs since conversion to dual fuel operation.



crease of 60 percent over its previous rating. To convert this increased power into electrical energy, a new 840-kw., 2400 volt alternator with v-belted exciter was installed.

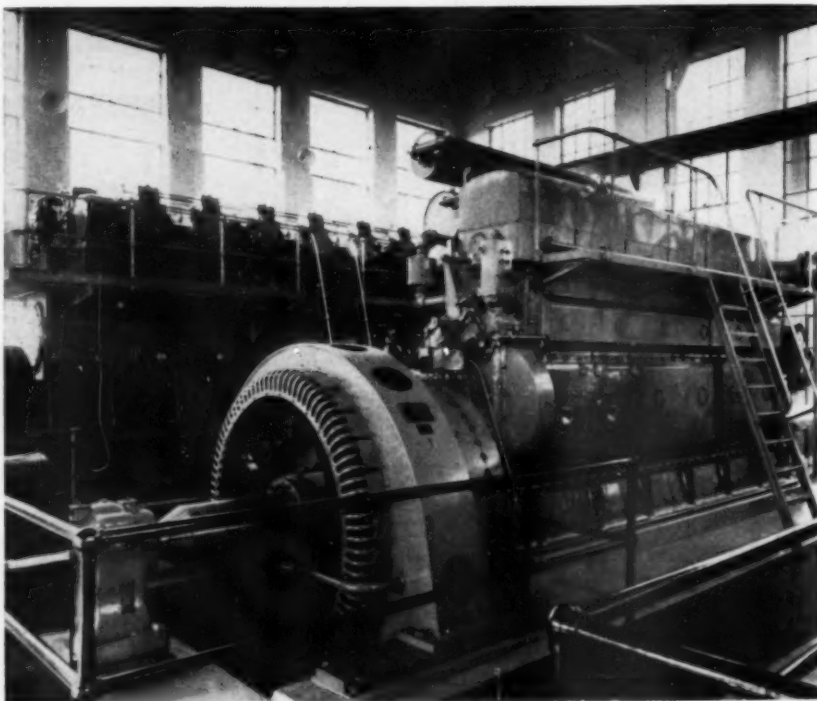
Greater power capacity was important, but Vermillion's primary concern was improvement in production economy. The city pays 10.82 cents a gallon for the fuel oil used both for the diesels and as pilot fuel for the dual-fuel units. At this price, an average of 13 kwh. per gal. of fuel for the Worthington diesel would mean a fuel cost of 8.3 mills per kwh. At this writing, we have available actual operating figures for 16 months of Worthington service as a dual-fuel engine, the period from July 1950 through October, 1951. In this period, the engine produced 2,269,000 kwh. while consuming \$6,756.28 worth of natural gas and \$1,376.92 worth of fuel oil. This translates into the following average fuel costs per kwh. Cost natural gas per kwh., 2.97 mills; Cost fuel oil per kwh., 0.61 mills; Total fuel cost per kwh., 3.58 mills. Compared with the 8.32 mills for the engine's full-diesel operation, this represented a saving of 4.74 mills per kwh. This is a reduction of 57 percent, a saving of more than \$10,700.00. The converted unit is the most economical prime mover in the plant and, in 1951, helped bring the plant's average fuel cost down to 4.7 mills per kwh. The plant buys its 28-30 gravity fuel oil in tank car lots and stores the oil in four 20,000-gal. underground tanks and one 100,000-gal. tank above ground. Oil for the Worthington engine is pumped through a meter to a 300-gal. elevated day tank. It goes then by gravity to an engine-driven supply pump which discharges at 25 psi. through an edge-type filter to the dual-plunger injection pumps.

There is an individual pump for each cylinder and pumps are spaced along the frame so that all discharge lines to the power cylinders are of equal length. Use of individual pumps permits perfect timing and cylinder load balance. The dual-plunger pump, with its small-diameter pilot plunger mounted on top of the main plunger, performs two functions. When the engine is operating as a dual-fuel, the small plunger supplies an accurately metered constant charge of pilot oil while the main plunger bypasses all other oil. When the engine functions wholly on oil, the pilot plunger continues to deliver its charge which is supplemented by main plunger delivery of as much additional fuel as the load requires. In both cases the dual-plunger pump has its advantages. Injection of the pilot charge over a relatively long period of time produces good atomization, retards detonation, reduces cylinder firing pressures, lowers exhaust temperatures, and cuts fuel consumption through improvement of combustion.

Lubricating oil economy has improved since conversion to dual-fuel and the engine now operates better than 10,000 hph. per gal. of lube consumed. A straight mineral oil is used for both cylinders and bearings. Some oil is drawn continuously from the pressure side of the engine's circulating pump and put through a cellulose-type filter. It is never necessary to add oil to the crankcase supply. In fact, some lube must be removed from the crankcase periodically to keep the level down. This oil is reused in the force-feed cylinder lubricators.

Each engine in the plant has a separate jacket-water circuit. For the Worthington, a motor-driven centrifugal pump circulates soft water through the engine jackets and a shell-and-tube heat exchanger. Three motor-driven centrifugals on a raw water header, pump raw water through the exchangers and an induced-draft cooling tower. City water is used for all makeup and is treated further in a Zeolite softener before entering the jacket water circuits. Air for the converted engine is drawn through an oil-bath filter to the exhaust-driven turbocharger. Air intake is regulated by an automatic thermal throttle which adjusts the quantity of air admitted to meet fluctuations in load, assuring a correct air-fuel ratio at all times. This is accomplished, not by control from the engine governor but by using sensitive exhaust temperature as the indicator of load variation. Temperature change actuates a compressed-air-driven servo-mechanism which positions the throttle valve. This

This Worthington Dual-fuel engine produces power at a fuel cost of 3.58 mills. The generator is General Electric and the governor Woodward.



use of exhaust temperatures compensates automatically for changes in heating value of the fuel or ambient air temperature, thus maintaining constant air-fuel ratio at all loads with resultant fuel economy. Load on the Vermillion plant rose precipitately after the war as domestic, industrial and REA consumption expanded. In 1948, plant production was 6,843,500 kwh. with a peak load of 1,850 kw. Then, in 1949, the city and the REA cooperative parted company with a resultant decline in plant load and production. The 1950 totals were 5,394,700 kwh. and a peak demand of 1,240 kw. In 1951, production rose to 5,463,800 kwh. with a peak load of 1,570 kw.

Dropping the REA load has not meant a real loss to the municipal plant. For one thing, reduction of peaks took some of the pressure off the plant.

Second, the REA consumption is steadily being replaced with more profitable load. Vermillion is a prosperous, growing community with a population of more than 5,300 and an assessed valuation of nearly \$5,000,000.00. There are more than 100 retail establishments and industrial plants such as an alfalfa dehydrating plant, feed mills, hybrid seed corn plant and creamery serve the rich agricultural region. This is the home of the University of South Dakota with an enrollment of 1,700 students. Thus, in 1949, income per kwh. of gross generation was 2.98 cents, while in 1951 comparable income was 3.12 cents. In 1949, operating profit was 1.27 cents per kwh. while the figure for 1951 was 1.32 cents per kwh.

The plant has an enviable financial record. Each year, \$31,000 is put into a depreciation fund which has enabled the city to buy all new equipment for cash without issuance of any bonds. The plant is



LIGHT FUND 1951

RECEIPTS\$170,738.25

DISBURSEMENTS:

Plant Operating

Fuel oil	\$ 6,093.67
Lubricating oil	1,616.94
Natural gas	14,697.05
Salaries	24,202.51
Water	439.72
Maintenance	240.95
Supplies	4,382.07
Misc. Labor	948.94

Distribution

Salaries	13,805.16
Supplies	9,568.63
Meter Equipment	612.33
Gas, oil, repair for truck	276.74
Truck equipment	1,235.25

Administrative and Miscellaneous

Insurance	2,016.34
Salaries	7,402.82
Supplies	1,488.46
Sales tax	3,932.54
Printing and advertising	397.70
Power, street lights	4,704.68
Telephone	297.11

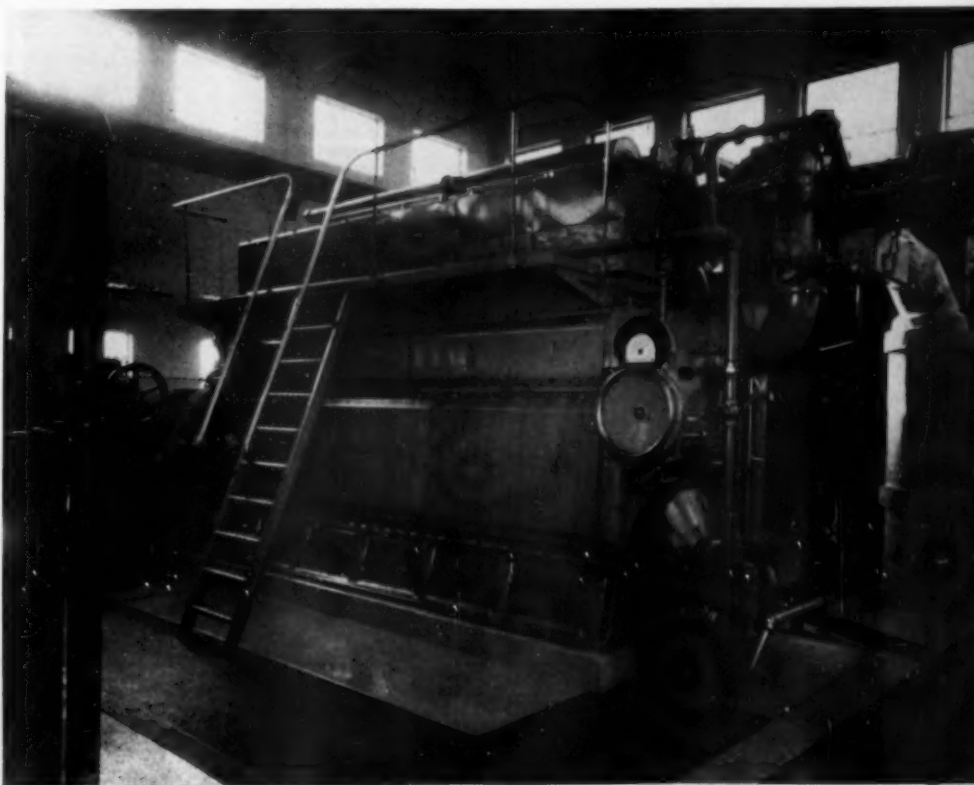
Total Disbursements\$ 98,389.61

OPERATING PROFIT\$ 72,348.64

The Vermillion municipal power plant houses four engines totaling 3,530 hp. ➡

completely free of debt. At the same time, profits have been sufficiently great to finance other municipal departments and civic improvements. The 1952 schedule calls for a \$60,000 expenditure for street widening, sewer construction and new street lights and \$25,000 for the street and fire departments, the library, swimming pool, parks and Chamber of Commerce promotion. Sound physical and fiscal management of the municipal utility must be credited for its financial success. In charge of the generating station is Earl Armagost who came to the plant in 1919 and has been chief

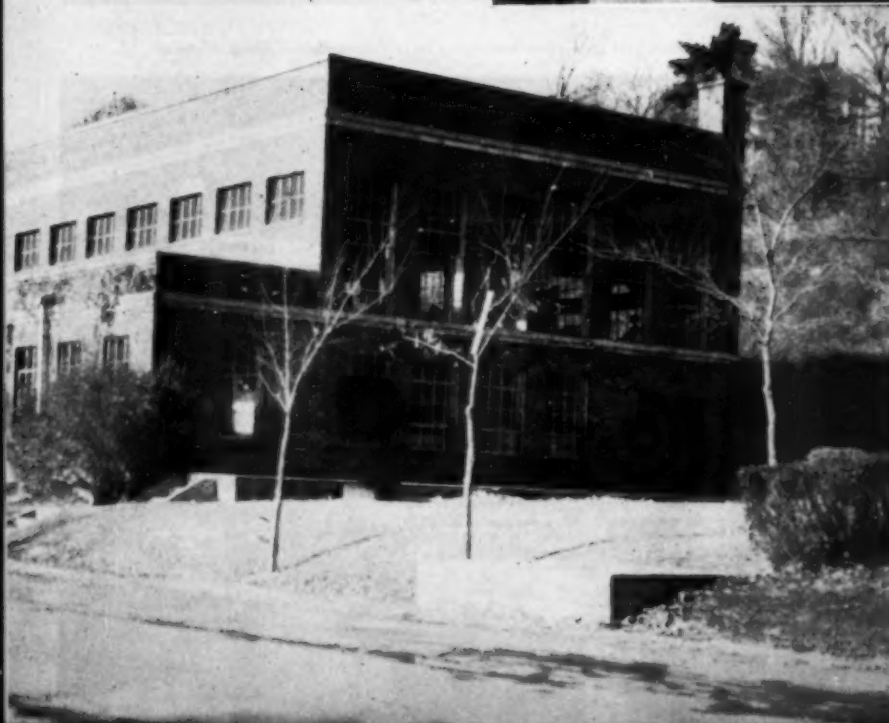
engineer since 1923. L. C. Brookman heads the distribution department and City Auditor Robert C. Walz handles purchasing, billing and financial records. General supervision is exercised by Major W. H. Jarmuth and the Council Light Committee consisting of Chairman Hugh F. Lee, Marcus Anderson and Louis Jorgensen. Vermillion has managed to counteract the general price inflation by improving production economy. With the converted dual-fuel engine delivering power at a fuel cost of 3.58 mills per kwh., management anticipates even greater profits in the year ahead.



➡ Originally rated at 750 hp., the Worthington was supercharged, speeded up and converted to dual fuel with a rating of 1200 hp.

Equipment List, Worthington Dual-Fuel Engine

Engine—One 1200-hp., 6-cylinder, 16 x 20-in., 360 rpm., supercharged dual-fuel.
Generator—General Electric Co.
Turbocharger—Elliott-Buchi.
Unloading pump—Viking Pump Co.
Meter—Worthington Gamon.
Injection pumps—American Bosch Corp.
Natural gas—Central Natural Gas Co.
Lubricating oil—Texaco Ursa P40. Texas Co.
Lube purifier—Briggs Filtration Co.
Lube filter—Cuno Engineering Co.
Oil cooler—Sims Company, Inc.
Jacket water pump—Worthington Corp.
Cooling tower—The Marley Co.
Heat exchanger—Ross Heater & Mfg. Co., Inc.
Air filter—Air-Maze Corp.
Exhaust silencer—Maxim Silencer Co.
Exhaust pyrometer—Alnor. Illinois Testing Lab.
Air valve positioner—Bristol Co.



POWER-ALONG THE ALASKAN HIGHWAY

By JAMES JOSEPH

DURING my recent trip up the wintertime Alaska Highway, I made it a point to stop at many lodges to find out what types of power plants were being used. Before I realized it, I had conducted a kind of survey. The survey, of course, was rather scattered, since it would have taken more than a month to visit each of the approximate 50 lodges (called "roadhouses" on the Alcan) along the 1600 mile route from northern Canada to Anchorage.

Still, several interesting facts came out of my visits: (1) A large number of English and Canadian-made diesel and gasoline power units, used both for lighting and to power small pumps and battery chargers, are found along the route. Customer acceptance of the English models, in particular, is high. However, it will have to be admitted that price has had something to do with introduction of these plants, particularly English, since Canada is favorably placed in the sterling block. (2) However, when lodges needed (and could afford) something larger than a one or two cylinder power unit, they usually turned to the American engines. (3) The general trend of opinion seemed to be that small English power plants used less fuel, were sturdier and could take the added load of cold weather and maximum hours—the result of long, Arctic nights when lights burn long and late. This opinion, similar to one I discussed recently in **DIESEL PROGRESS** concerning South American acceptance, is something which American diesel manufacturers will have to meet and beat. But facts are facts. And these are the facts.

I purposely surveyed only power plants owned and operated by lodge-owners because this remote section seemed a good preference-testing spot. There are a number of rather large diesel and gasoline engines in use along the Highway, but these are generally installed at various U. S. Army and Canadian Army signal stations, powering telephonic and radio transmitters, and are of the standard army models.

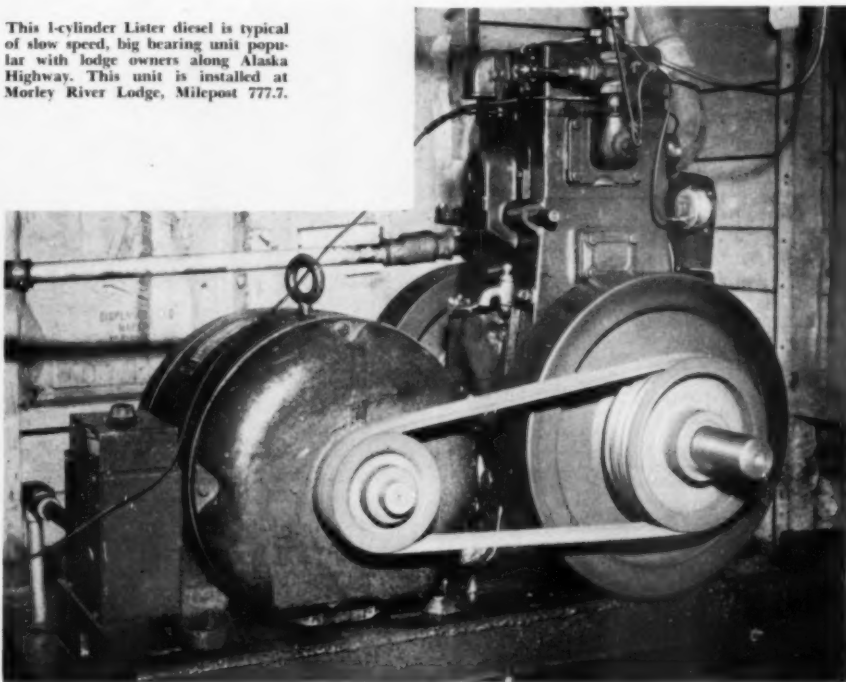
Two diesel plants seemed to typify the route's preferences: (1) a 2-cylinder, vertical four-stroke Petter diesel, made by Petters Ltd., Staines, Middlesex, England, which has been installed within the last four months at Coal River Lodge, Milepost 553. B. R. Kennedy, the lodge's owner, is a Canadian and an oldtimer to the Highway. (2) The other unit, located at Milepost 1306 in Alaska, about 400 miles out of Anchorage, is installed at Forty-Mile roadhouse. This is a new installation, and one of the Highway's most modern. It's a Caterpillar D-315 diesel electric generator set, rated 30 kw. at 1200 rpm., and is rigged with vapor phase cooling. The installation was made by Alaska's Northern Commercial Co., a sort of Hudson's Bay Co. for its region. The Petter diesel engine at Coal River Lodge has several advantages, according to Mr. Kennedy. It is water-cooled, cold starting, and can run on one cylinder if necessary. It has two

separate heads, a bore of 3.15 inches, a stroke of 4.33 inches (67.46 cu. in.). The compression ratio is 16.5:1 and rated power and speed: (1) 6 bhp. at 1000 rpm.; (2) 8 bhp. at 1200 rpm.; (3) 10 bhp. at 1500 rpm. The nozzle is a Bryce. Oil sump capacity is 5 pints, and cooling tanks hold 120 gallons. Lube oil being used at the time of my visit (during the winter) was Shell Talpa 10w, recommended for the plant when the air temperature

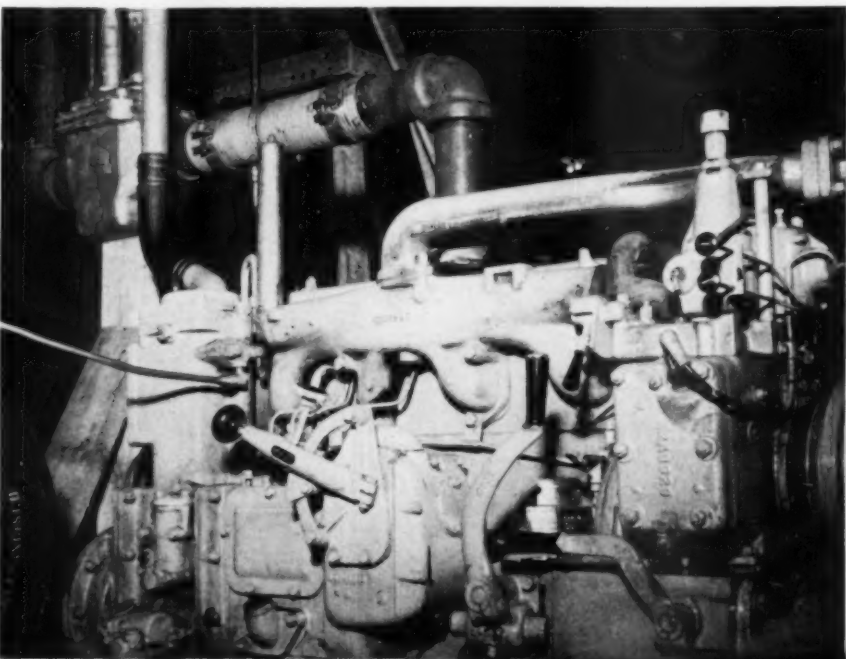
was under 20 degrees F., which it was—by about 40 degrees!

Customer requirements for these home-owned diesel plants are simple and basic. Said Mr. Kennedy, "All I ask is that it keep running, and stay running, most of the day and night." Units such as these, without the benefit of standby maintenance crews, take a real beating. And performance counts.

This 1-cylinder Lister diesel is typical of slow speed, big bearing unit popular with lodge owners along Alaska Highway. This unit is installed at Morley River Lodge, Milepost 777.7.



The Caterpillar engine and vapor phase hook-up at Forty-Mile roadhouse, Alaska Highway.



Before I discuss the vapor-cooled engine at Forty-Mile roadhouse, it might be well to note that another popular British engine is the Lister. One of these is installed at Morley River Lodge, Milepost 777.7. Clyde Wann, who runs this lodge, told me that his Lister "runs night and day, darn thing never stops." His is a 1-cylinder, 60 cycle, 110 vac. single phase, rated 5 kw. (at 1800 rpm.). The diesel drives a Kato light plant (generator). Mr. Wann said the thing he liked best about his Lister was its slow speed, big bearings and minimum maintenance.

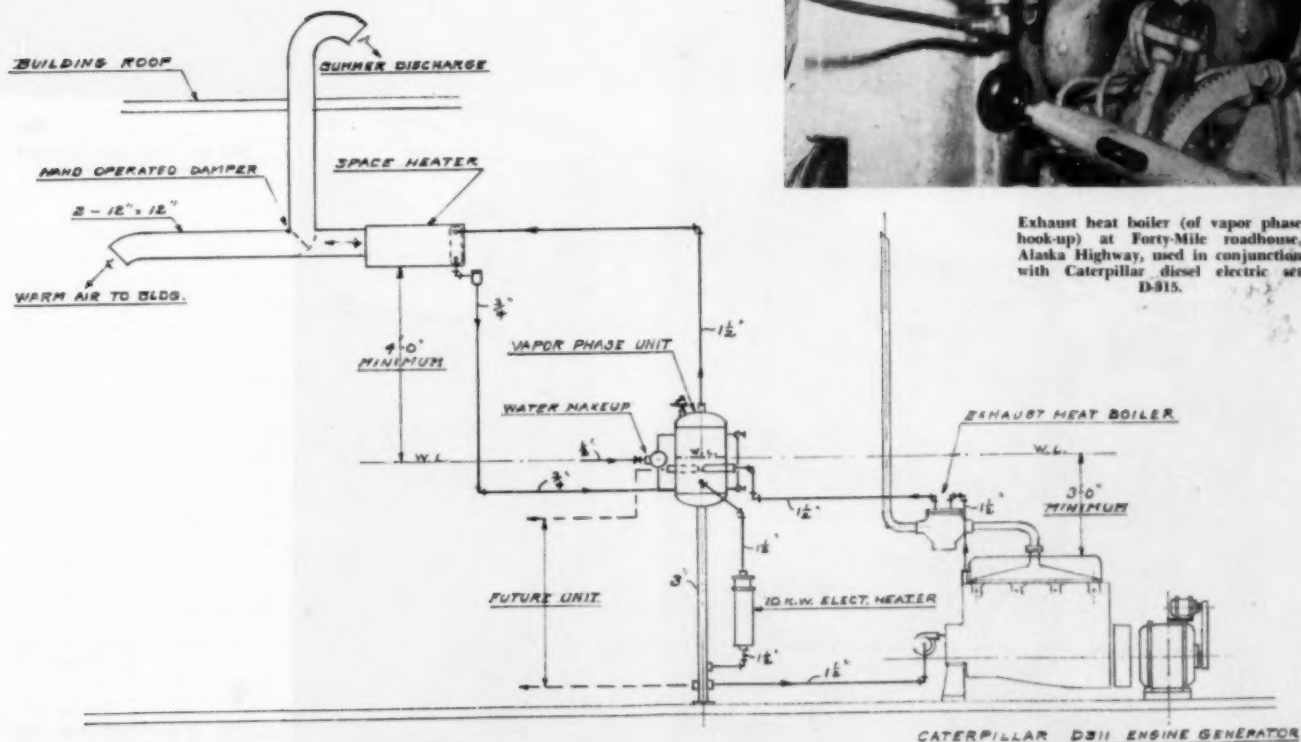
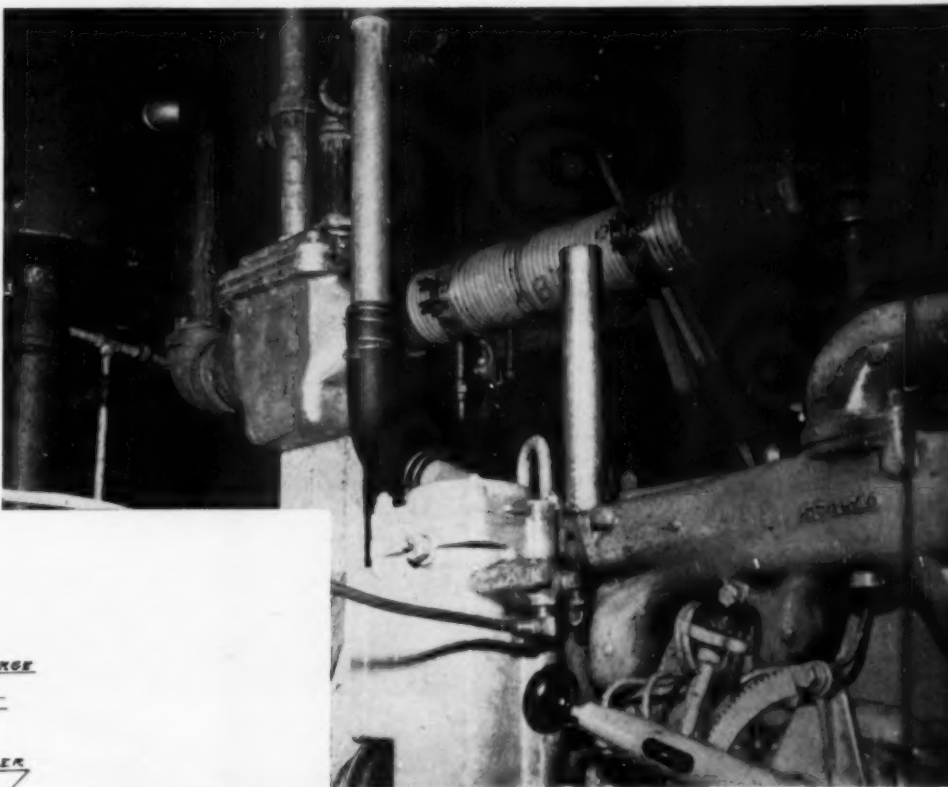
Forty-Mile roadhouse's Caterpillar D-315 (CAT) not only supplies electricity for lighting the large lodge and adjacent bunk house, but powers pumps, both water and fuel, and also heats the place's large truck garage—one of the few garages on the Highway big enough to house trucks. Engine water exhausts at 212 degrees to the exhaust heat boiler, thence to the vapor phase unit, mounted above the engine. The vapor phase unit is not only fed by the engine's water, but of course, there's a make-up water connection. In addition, there's a 15 kw. electric heater (10 kw. was originally specified), which pre-heats the vapor phase unit, bringing it up to temperature when the motor is running cold.

As the sketch shows, this engine is not only a power unit, but is also a heat unit. There is a 15 kw. electric immersion heater which at times of low kw. demand is turned on thus artificially loading the engine to its capacity of 27 kw. Waste heat, therefore, from the fully loaded engine, is recoverable, plus 15 kw. of electric heat used to heat water, flashes to steam in the vapor phase unit just as the jacket and exhaust heat does and for each 15 kw. of electric energy introduced into the vapor phase system, 5100 btu. of heat is given out.

This electric heater supplies immersion coils in the vapor phase unit. Steam then vents to a 148,000 btu. space heater which in winter heats the garage, and will eventually, it is hoped, supply some of the heat for the various buildings. There's a hand operated damper between the space heater and pipes leading to various of the buildings (including the garage, where the diesel unit is installed). In summer, this damper is positioned to vent the heat to the outside. The steam, after use, is condensed and returned to the engine water jacket. Steam enters the space heater via a 1½-inch pipe. I was told by the owners of Forty-Mile

roadhouse that the vapor phase unit has a 6 to 7 psi. steam pressure when operating the wintertime heaters, and a pop-off safety valve set for 9 psi. Ray Scoby and "Red" C. Post, owners and partners in Forty-Mile roadhouse, said that while the Caterpillar unit hadn't been installed more than a month, it seemed to be doing everything claimed for it, but they admitted that the investment was a bit steep. For one thing, freightage on the unit to Alaska added a great deal to the price.

These were some of the results of my on-the-spot, although somewhat scattered, visits along the Alaska Highway.



"GENE C. HUTCHINSON"

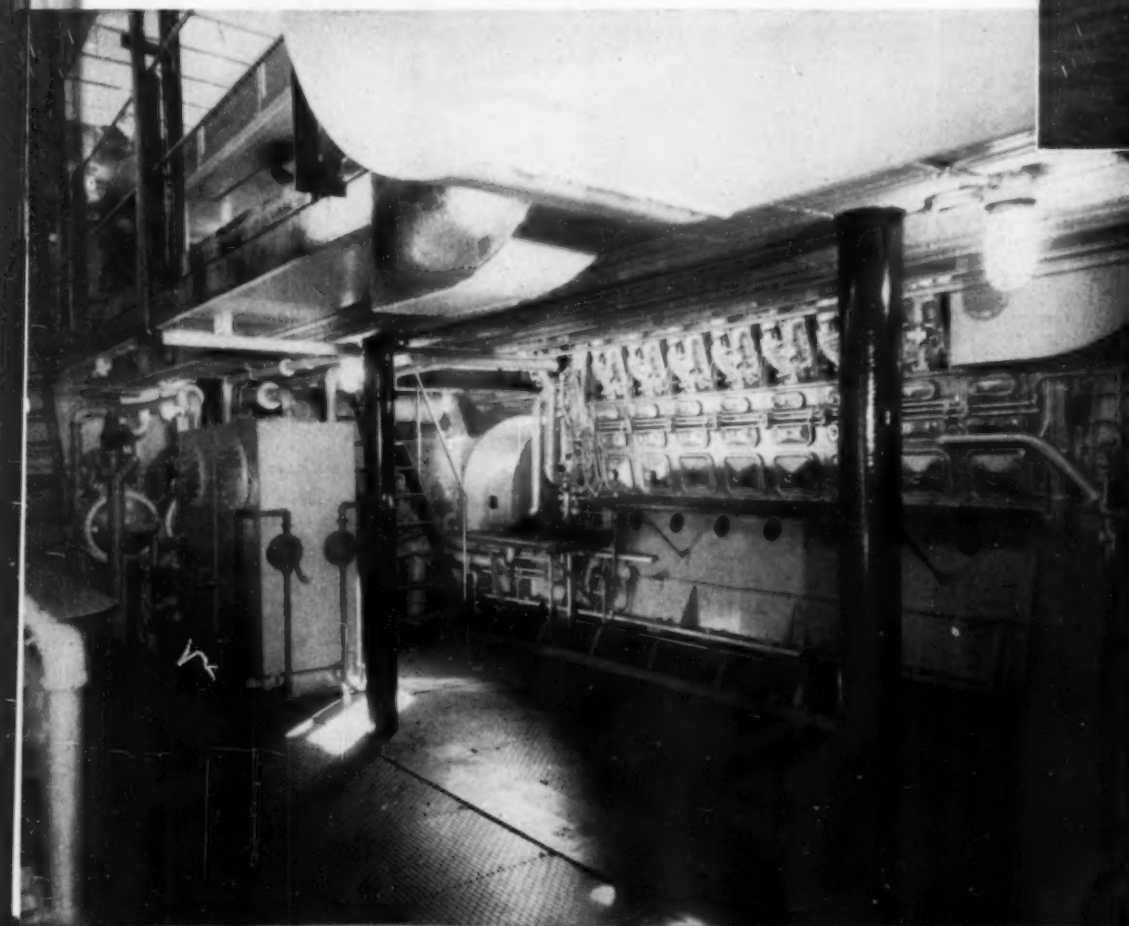
ON April 1, 1952, before a large contingent of visitors from Cleveland, Mrs. Gene C. Hutchinson christened the new 3200 hp. twin screw towboat named for her husband. This beautifully streamlined towboat, recently completed by the St. Louis Shipbuilding & Steel Company, is the first vessel for the newly formed Hutchinson Barge Line with headquarters in St. Louis. Built primarily for high speed towing between New Orleans and Pittsburgh, the Twin Cities and Chicago, the *Gene C. Hutchinson* at 3200 hp., is one of the most powerful towboats on the inland rivers. In addition to its powerful propulsion plant the vessel is one of the most beautiful afloat. Its sleek streamlined deckhouse houses completely air-conditioned quarters for 18 men.

The *Gene C. Hutchinson* is 156 feet in length with a beam of 35 ft. and a normal draft of 8 ft. Propulsion is provided through two General Motors, Cleveland Division, diesel engines, each rated at 1600 hp. at 750 rpm. Speed reduction is through two $3\frac{1}{2}$:1 ratio reduction gears with Airflex clutches. The 100 inch diameter cast steel propellers designed by the St. Louis Shipbuilding & Steel Company are turned at 215 rpm. The all welded steel hull is constructed on the longitudinal and transverse framing system. The fair, well rounded lines of the semi-vee bow and the two tunnels are the result of many model tests and the builder's years of experience. The bottom and side plating is $\frac{3}{8}$ -in. increased to $\frac{1}{2}$ -in. in way of the

bilge and tunnels. All bulkhead plating is $\frac{3}{8}$ -in. with both horizontal and vertical stiffeners. A heavy fender of $\frac{3}{8}$ -in. bent plate is provided on each side, for full length of the vessel.

The *Gene C. Hutchinson* is built to the highest classification, for River Service, of the American Bureau of Shipping. The deckhouse is of steel plate construction completely welded. The well equipped quarters for 18 men are air-conditioned by a centrally located Trane #10SC, 10.8 ton capacity unit. All exposed areas of the living spaces are insulated with 2-in. Fiberglas and all surfaces are sheathed with $\frac{1}{4}$ -in. tempered Masonite. The floor covering throughout is Armstrong Linotile. The spacious pilot house is fully equipped with the most modern of navigation equipment, including Sperry Radar, Sperry Gyro Pilot, R.C.A. Radio-Telephone and controls for steering, main engines, searchlights, air horn and intercommunication system.

The engine room is acoustically treated for sound absorption. Two large axial flow blowers provide air through ducts to the lower engine room. The General Motors main engines are Model #16-278A, $8\frac{3}{4}$ -in. x $10\frac{1}{2}$ -in., each rated at 1600 hp. at 750 rpm. Reduction is through Falk $3\frac{1}{2}$:1 ratio reduction gears. The engines are controlled from the pilot house. Cooling of the main engines is accomplished by circulating the jacket water through the highly efficient St. Louis Shipbuilding & Steel Com-



3200 hp. Twin Screw Towboat
Gene C. Hutchinson.

Port Main Engine and Falk
 $3\frac{1}{2}$:1 Reverse-Reduction Gear.



panelled with walnut throughout. The crew's lounge in addition to the usual furniture has a large television set. The well laid out galley has a Hotpoint electric range, a Tyler 82 cubic foot refrigerator, and a Tyler Harderfreeze, 18 cubic foot deep freeze.

Especially built to be used with the *Gene C. Hutchinson* are three integrated oil barges, each 290 ft. x 50 ft. x 12 ft. The tow is designed to have a pool speed of 12½ mph. with a cargo of 10,000 tons. The *Gene C. Hutchinson* should give its new owners the many years of rugged service for which St. Louis Ship towboats are noted.

List of Equipment

Main Engines—(2) General Motors, Cleveland Division, Model #16-278A, 8¾ in. x 10½ in., each rated at 1600 hp. at 750 rpm.

Reduction Gears—(2) Falk, 3½:1 ratio, with Air-flex Clutches.

Exhaust Silencers—(2) Maxim.

Fuel Oil Filter—(1) Briggs.

Lube Oil Transfer Pump—(1) Blackmer Pump Co.

Fuel Oil Transfer Pump—(1) Blackmer Pump Co.

Lube Oil Coolers—(2) Harrison.

Electric Generators—(2) General Motors, Model #368-A.

Air Whistle—(1) Kahlenberg Bros.

Air Conditioning Unit—(1) Trane.

Searchlights—(2) Carlisle Finch.

Gyro Compass—(1) Sperry Corporation.

Gyro Pilot—(1) Sperry Corporation.

Radar—(1) Sperry Corporation.

Radio-Telephone—(1) Radio Marine.

Left to right: Gene C. Hutchinson,
Mrs. Gene C. Hutchinson, Mrs. J. M.
Johnson, H. T. Pott.

pany closed duct skin cooling system. Electric power is provided by two General Motors, Model #368-A diesel engines driving Delco 100 kw., 440 volt, 3 phase, 60 cycle ac. generators, each including a 20 kw., 120 volt dc. generator. The generator as well as the main engines use the skin cooling system. The fire pump is a Gardner-Denver, Size 2, Type B, 100 gpm. at 118 ft. head driven by a 5 hp. Century Electric Company motor. A Carter #701-2 Bilge Pump driven by a ¾ hp. Continental motor is provided with suction connections to all hull compartments. Two 7½ hp. motor driven Worthington air compressors rated at 11.4 cfm. provide air for starting the main engines, air whistle, etc.

Motor driven fuel oil transfer and lube oil transfer pumps are provided for the efficient transfer of oil between storage tanks and service tanks. There are two independent steering systems of the St. Louis Ships standard electro-hydraulic follow-up type. One system actuates the two contra-guide steering rudders, and the other actuates the four backing rudders.

The spacious quarters are fully equipped in the modern manner. The officers' lounge is attractively



MESABI RANGE

By DWIGHT P. ROBISON

IN the fabulous Mesabi range in Minnesota, where most of the nation's iron ore comes from, construction men's methods and earthmoving equipment are being used to increase productivity of the mines in spite of declining reserves. Before World War II, it was common to ship three tons of ore from every four tons of material mined on the Mesabi. At present, however, the ratio is one ton shipped for every four tons mined. Yet this falling ratio is more than made up for by increasing man-hour productivity. In 1930, four tons of material were stripped for every man hour worked. Now six tons per man hour is the rule.

The introduction of higher-powered, bigger-capacity earthmoving machines of all types is credited by mining men with having a large share in the increase. Rubber-tired dump trucks carry 30-ton loads up and out of the mines at new high speeds. New, towering shovels and draglines work faster with bigger bucket capacities. Miles of conveyor systems speed the ore up steep sides of the

canyon-like open pits. Crawler tractors are saving hundreds of man-hours by doing a variety of jobs at low costs, unheard of ten years ago. This growing fleet of contractor-type equipment allows accelerated stripping schedules as known ore-bodies are extended to keep up with growing demand.

Versatile crawler tractors like the International TD-24 build mine roads, relocate railroads in the pits, maintain waste piles, and clear around loading areas to permit faster speeds for rubber-tired equipment. In addition, crawler tractors equipped with bulldozers blend different grades of ore on pit floors. In this way a little high-grade, direct shipping ore brings up the iron content of lower grades to meet steel mills' requirements. This technique has helped materially in increasing the life of the Mesabi deposits. A new experimental truck is being operated with two large Cummins NHRBIS diesels rated at 300 hp. each. This truck, with a 50-ton capacity, will further increase productivity at the mines if it proves practical.

Here one man and a machine are doing a job that took a number of men to do a few years ago on the Mesabi Iron Range. The International TD-24 tractor below is making a new road over a cliff to permit trucks removing iron ore from one of largest open pit mines to take a shorter, faster route to the top.

32





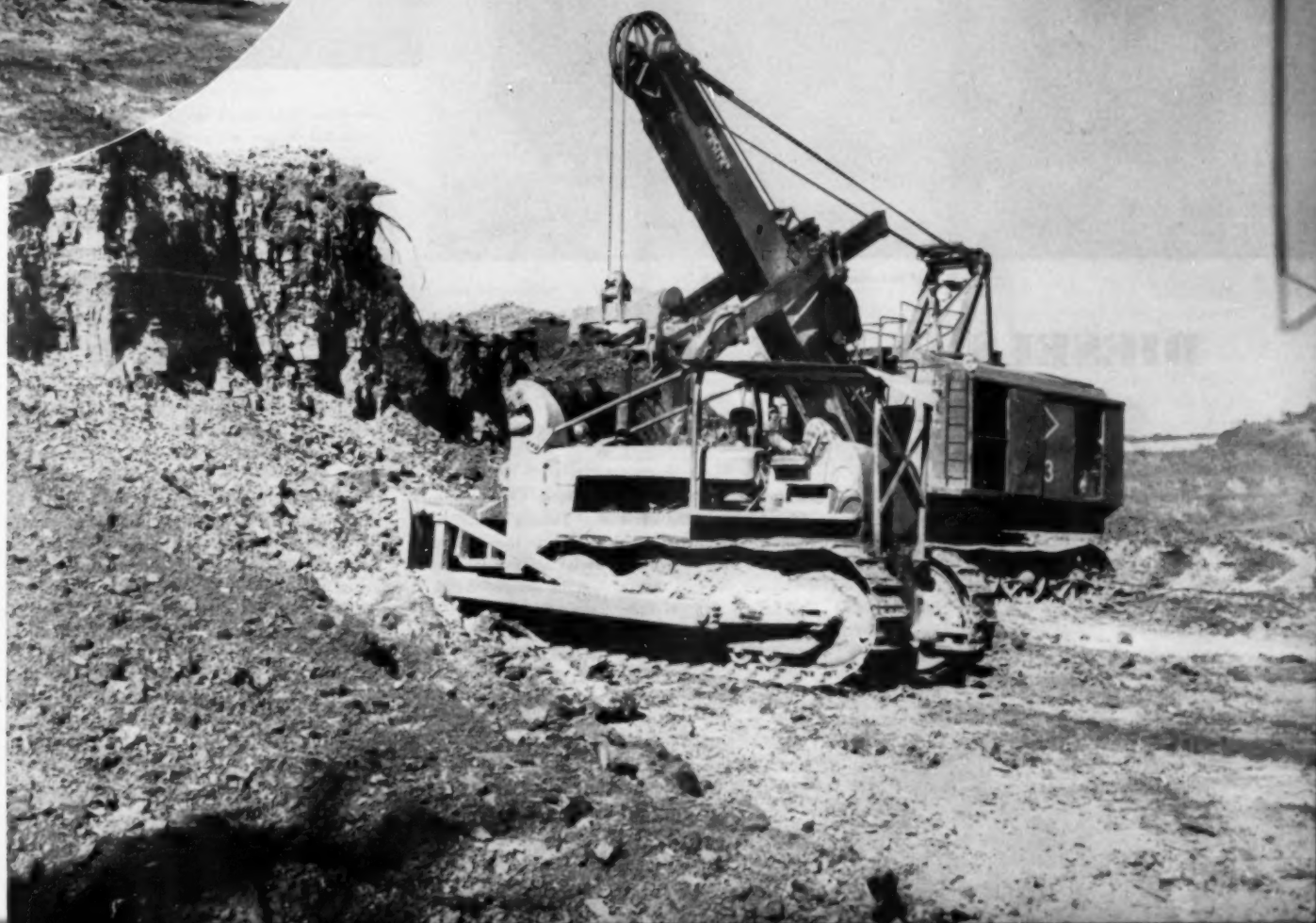
A fast motor-scraper pushed by an International TD-24 tractor is loading waste material from one of the mile-long dumps of the Mesabi Iron Range. (In circle) Exhaust from the diesel engine is used to heat bed of truck to prevent freezing of ore during periods of low temperature. This small feature saves hundreds of man-hours formerly necessary for loosening the load permitting faster schedules for mining the ore the year round.

With iron ore consumption at a record peacetime high of 105 million tons in 1950 and 129 million tons in 1951, the continuing importance of the Mesabi is easily gauged. Of the 144 million tons of iron ore steelmakers expect to use in 1953, 100

million tons, or about 74%, is still expected from the Mesabi and Lake Superior areas. These figures make it clear how dependent the nation will be on the Mesabi and its priceless fleet of earthmoving equipment during the critical years ahead.

International TD-24 tractor in foreground and large shovel behind move tremendous quantities of material to uncover ore deep in the pits now that the more easily mined ore is nearly gone.

33





First of two dozers in road-making job.

DIESELS IN THE MUSKEGS

By JAMES JOSEPH

UPPER HAY RIVER, ALBERTA.—"This is dieselization's finest hour," said the parka-clad oil contractor. He said it, mindful of diesel's historic importance on the beaches of the South Pacific during World War II. He was likewise cognizant of the vast armada of dieselized power which pushed through the Alaska Highway in the short space of one year. But, in the table-flat bitterly cold expanses of northern Alberta's muskegs, which reach past the Arctic Circle clear to the shores of the Arctic Ocean, it is diesel might which has met the muskegs head-on—and has conquered them.

We were standing beside the snow-packed Mac-

Kenzie Highway, which runs from Grimshaw to Hay River, on the Great Slave Lake, a distance of some 450 miles. The highway cuts through the world's most hazardous diesel trap—the muskeg. And all through the muskeg, in isolated camps, without benefit of hot showers or other normal comforts, dozer operators were pushing through roads on 3 x 6 mile grids that block up the once roadless muskegs. Before the coming of diesels, there was no road save the MacKenzie. Today, by the most conservative estimates, there are thousands of miles of roads. Why are they there? These roads form the shooting pattern for seismographic crews which follow close behind the diesels. For



two years now, every major oil company in the world has thrown winter-wise seismographic crews into northern Alberta's muskegs. By recording the reflected shock waves from surface explosions, seismologists are learning a lot about the sub-stratas—stratas which they hope will some day yield a vast, yet untapped storehouse of oil. The sensationally successful new fields in south and central Alberta—Leduc and Redwater—are spurring them farther and farther into the Arctic, tracking down the stratas which have already yielded what is probably one of the greatest oil finds in the world.

But to understand the tremendous and heroic role which diesels are playing in the far-north, you've got to understand the muskegs. Yet there are plenty of seasoned dozer operators who admit that the muskegs still fool them. A dozen big dozers have been lost to the muskeg, sunk so deep (even out of sight), that no machine can reach them. Last winter a dozer operator pushed his machine across a "soft spot" in the muskeg. Suddenly he felt the dozer lose traction and begin to sink beneath him. The driver jumped clear and stood by helplessly as the dozer sank from sight. The operator cut a sapling, drove it into the frozen ground so he'd know where the machine went down, and walked back to camp for help. Camp equipment couldn't locate the machine. Calls went out for more specialized equipment. A drag-line was hurried north from Peace River, 250 miles to the south.

DIESEL PROGRESS



Here's what the bleak muskeg looks like to diesel driver.

Thousands of miles of roadway have been cut by dozer crews in the northern muskies.

Finally it located the machine at a depth of 30 feet. As you might imagine, the dozer was never raised.

This is the Dr. Jekyll and Mr. Hyde existence of dozer teams in the muskeg. You can never tell about muskeg. In winter, after the first "setting" freeze-up, the vast summertime, floating mass of peat and vegetation, becomes crusted over. The mass is saturated down to clay, which may lie at a depth of 50 feet. Or, it may have no bottom at all. The hard crust that freezes in -20 to -60 below zero temperatures is a fooler. Sometimes an early snowfall forms an insulating blanket. The floating bog freezes a few feet down, but the snow insulates the sub-surface mass. A dozer lumbers over this crust. It breaks through. And sinks from sight. In summer the muskies are impassable. If a dozer isn't rushed "outside" before spring break-up, which comes with suddenness in the far-north, it may have to be driven to higher ground and abandoned for the summer. To attempt a race to safety over the thawing muskies is not only folly

—but impossible. So the bush operation has been a winter-time maneuver.

There are, during the 1951-52 exploration season, some 152 seismographic crews working in Alberta and Western Canada. Sixty-three of these are operating in the muskies north of Peace River, jumping off place in the Arctic. For every seismographic crew in the field, there are one or two dozer crews, probably 100 road-building dozer outfits, usually with 2 to four dozers, working the muskies. Dozer parties strike off from the MacKenzie Highway into the "bush"—as the muskeg is nicknamed. They may be isolated, reached only via their self-made roads, for months. Behind each dozer is dragged a skid-mounted house. There's the bunkhouse, cook shack, fuel sleigh and spare parts sled. Each crew is self-sufficient except for fuel supplied by trucks.

Sometimes dozer teams scrape out their own landing fields in the snow. Upon these alight ski-rigged bush planes, bringing in occasional mail and food. Of all bush operations, none is so rugged, so dirty,

nor so morale-shaking as the dozer crew's job. Baths are a luxury. Beards grow long for protection against the bitter cold that oftentimes plunges to -50 below. And the dozers are kept running 22 hours a day, during two, 11-hour shifts. When a driver climbs down from his rig, tired and cold and hungry, he slips into the bunkhouse. When he awakes he may find that a dozer has towed the skid-mounted house a couple of miles on ahead, as the other tractors open wide swathes in the muskeg. During the long, cold night operation, wolves howl around the crews. Coyotes bark just out of sight of the tractors' headlights. And occasionally a dozer driver must stop for a belligerent cow moose blocking the way. Big dozers have even ousted hibernating bears.

There are also the dangers. Prime among these is cold. Frost bite is old-hand to muskeg dozer operators. "Every man," a diesel contractor told me, "is on his own. He's out there working alone, or with another dozer, but there's no one near to say, 'Hey, Pete, your nose is freezing.' Our operators





Walking down a birch tree in the muskegs.

must sense their own dangers—and protect themselves." This year, as a dozer operator worked far ahead of the others, a tree he was pushing over suddenly careened through the cab, pinned him to his seat. Next morning when the others finally located him, the operator was dead, his blood frozen around the gaping wound. It wasn't a pleasant picture, but then, there's nothing pleasant about the muskegs.

Almost every make of diesel tractor equipment is working on the muskegs. There are Allis-Chalmers HD-10s and HD-14s; and Caterpillars—D-7s, D-8s and D-6s, and Internationals. Mostly they're using standard 12-ft. dozer blades, having found that brush-cutting blades don't do a good road-building job over the rough terrain. For, while the muskegs may look flat in the air, they are hummocked and bush-grown.

In operations, one dozer usually goes ahead, knocking down the trees. Some trees encountered have been as large as 30-inches diameter, and most are birch and spruce. Following behind the "knock-down" man, at about 30-50 feet distance, is a second dozer—smoothing down the road. A 30-ft. wide swath is knocked down first, but the actual road is only 12 to 14-feet wide—just wide enough to allow the seismographic crews' snowmobiles and shallow-hole drilling trucks passage. These aren't luxury roads—they're rough, especially through the more thickly muskeged areas. For the frozen muskeg is a matting of roots and bush, and defies grading.

The pride of the dozer operators is their ability to doze a straight road—straight as the surveyor's line. And from the air, which reveals every deviation from the surveyed line, you come to realize what a remarkable job these bush operators have been doing. As far as the eye can see, the muskeg stretches below—and criss-crossing one upon the other are the roads, as if the machines had been playing a calculated game of tick-tack-toe. Dozer operators have their doubts that their roads will last very long, once the summer's thaws swallow up the hard-packed snow. But native Slavey Indians—rejoicing in this road bonanza—think differently. They say the roads will last a good 10 years, and while they do, trapping will be easier.

While there are scores of oil companies fighting for exploration reserve leases in these muskeg Crown Lands, the big operators—the "big six"—are doing the lion's share of the job, and spending the larger portion of the estimated \$2.6 millions which are monthly being thrown into the operation. As of Feb. 1952, millions of acres of "reservations" were under lease by the oil companies—for seismographic work only. Imperial Oil Ltd. (a company controlled by Standard Oil of New Jersey) held 10,420,356 acres of reservations in Alberta, about 6.7 million of them muskeg acres. The California Standard Co. had latched onto 5,046,137 acres, about 3½ million in the Arctic muskegs. Socony Vacuum Exploration Co. and subsidiaries had 4,273,237 acres; Shell Oil of Canada, 3,703,446 acres; the age-old Hudson's Bay Oil

and Gas Ltd., now switching from fur to oil, had leased 3,323,240 acres; and Gulf Oil of Canada had 3,235,671 acres. Companies with extensive, but smaller acreages, were: Sun Oil Co., Texaco Exploration Co., Stanolind Oil and Gas Co., and Pacific Petroleum.

Operationally, the big question is how do men keep warm in the muskegs? Most dozer cabs are canvas covered, and the heat from the motors usually keep things comfortably warm. Yet there's no protection against driving winds, nor the blue haze that forms mysteriously over the muskegs when the thermometer drops past 40 below. Treachery is the muskeg's trump card. Dozer operators tell you that they don't like to track over the same spot more than once. There's reason behind this operational wisdom. Last winter an HD-14 went down in a slough. The dozer had tracked over the place three times previously with no trouble. Suddenly, the fourth time over, it sank. The entire rear portion of the tractor went out of sight and only the blade wedged itself in the ice, and stayed above ground. A winch was rigged and managed to get the dozer to safety, although by the time rescue operations were begun, the machine had sunk to a depth of 8-feet! Next winter, the northern Alberta working crews expect to have crossed over into the desolate, even more muskeged Northwest Territories, deep within the Arctic Circle. "There's nowhere our dozers can't operate," a chief of party says admiringly. "If there were enough ice, we'd doze on to the North Pole."

LAS ANIMAS, COLORADO

Nordberg Units Take Over Bulk of Load From Diesels and Purchased Power; Will Boost Profit \$50,000 a Year

By RALPH BARBEE*

TWO new Nordberg dualfuel engines went into service in the plant of Las Animas Light & Power, Las Animas, Colorado, in the closing months of 1951, more than tripling the capacity of the plant and ushering in a new era of low production costs and high profits. For the first time in its 10-year history, the plant is capable of carrying the city's demand independent of purchased power. Cost studies indicate that the change will mean an increase of more than \$50,000 a year in electric department profits. The two new engines are identical except that one is supercharged and the other non-supercharged. Both are four-cycle Nordberg units with eight cylinders of 16 inch bore and 22 inch stroke, developing rated horsepower at 327 rpm. The supercharged unit has a

*Superintendent, Light & Power.

sea level rating of 1750 hp. or 1610 hp. at Las Animas' 3877 ft. elevation. The other engine is rated 1165 hp. sea level or 1050 hp. at this altitude. The capacities of the engines are respectively 1130 kw. and 735 kw. at the site. The non-supercharged engine is equipped with oversize generator to permit supercharging at a later date when required.

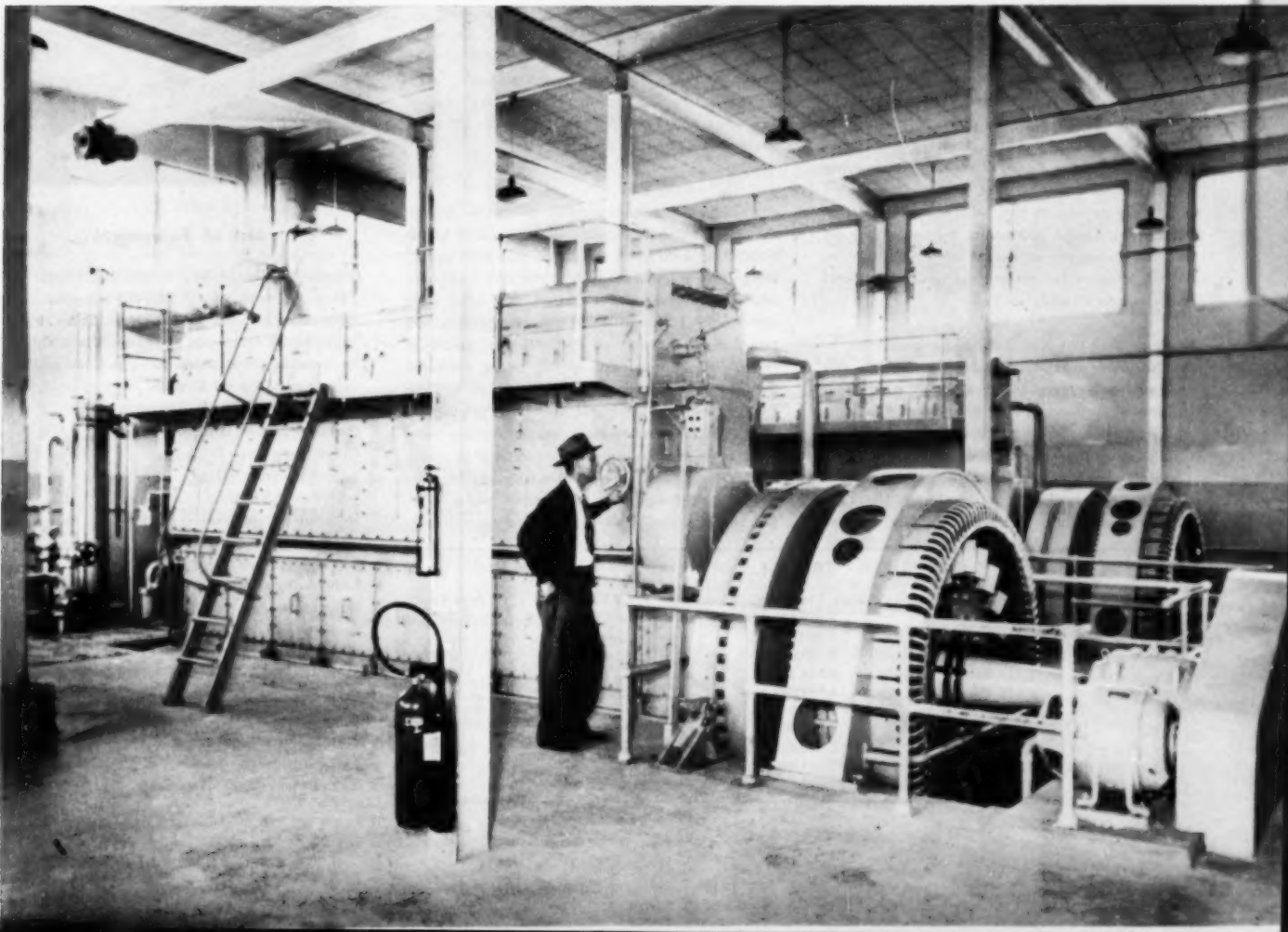
This southeast Colorado city of 3,200 population established its municipal power plant in 1941 although the private company serving the area still had five years of franchise remaining. As soon as it became evident that the city was irrevocably committed to its power program, the company negotiated the sale of its distribution system, an old power house, and the line to the Fort Lyon Veterans' Hospital seven miles from town. The city

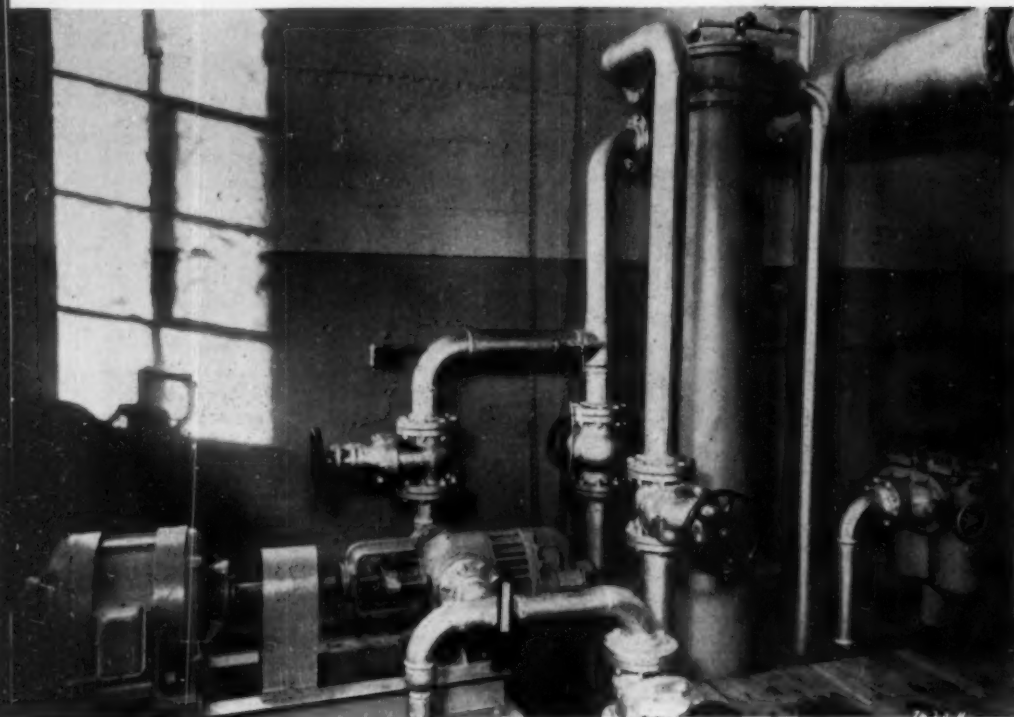
then installed in the building acquired from the utility three Model 32E14 Fairbanks-Morse diesels with sea level ratings of 450 hp., 375 hp. and 225 hp. This gave Las Animas an effective capacity of less than 700 kw.

From the first, it was necessary to supplement plant production with purchased power. Peak load at the outset was 600 kw. and rose steadily from year to year, reaching 1200 kw. in 1950. Obviously this required even greater dependence on the utility company and entailed even larger demand charges added to the cost of purchased power. At the same time, fuel prices and other operating costs were rising. In 1950, the 2,883,000 kwh. purchased cost \$37,288.82 or 12.91 mills per kwh. The oil-burning engines produced a net of 2,267,680 kwh. (after

Superintendent Ralph Barbée inspects the new Nordberg Dualfuel engines which produce a kilowatt hour at a fuel cost of 3.5 mills and will boost plant profits more than \$50,000 a year.

37





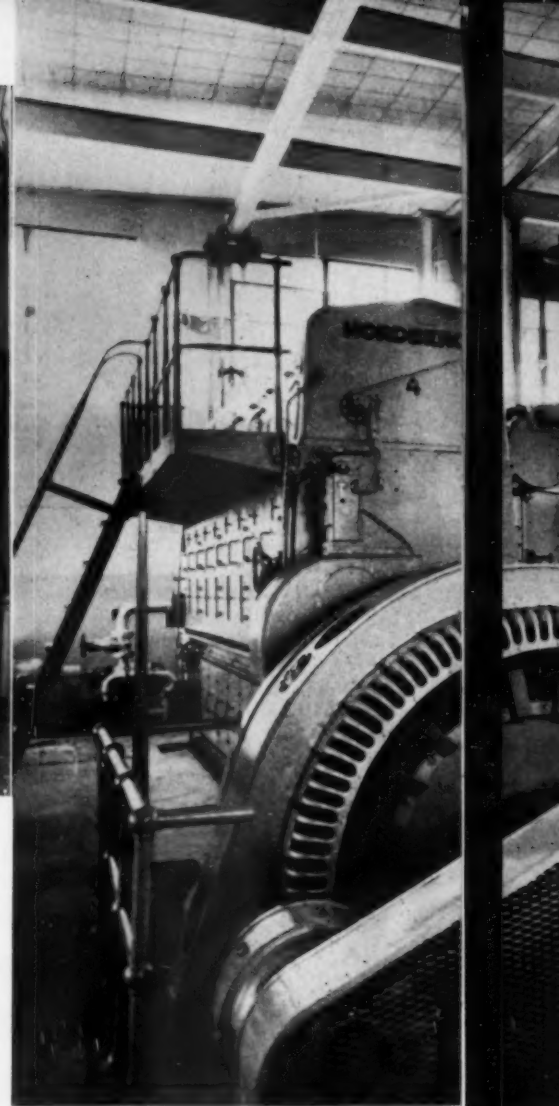
Three elements in the lube system of each Nordberg are the Haight main lube pump (motor-driven), the Ross cooler and the Elliott magnetic strainer.

deducting plant use) at a total cost of \$35,506.04 or 15.66 mills per kwh. To complicate matters further, the demand on the utility was approaching the capacity of the existing transmission line and the company offered two alternatives: either it would build a new line to the plant and sell energy at a flat 2.25 cents a kwh. or the city would build a nine-mile line to pick up power at the county border at a flat 2 cents a kwh. A survey undertaken for the city by the Rocky Mountain Engineering Co. of Denver indicated that the best solution lay in a plant expansion and utilization of available natural gas. Larger production volume would cut unit costs since no additional labor would be required. Modern dualfuel engines would bring fuel costs down to 3.5 mills per kwh.

Implementing this plan, Las Animas purchased the two Nordberg dualfuel units, large enough to carry the existing load and to allow for substantial expansion of demand. The engines were first operated in August, 1951, and generated sizable quantities of power in the last three months of the year. The full effect of dualfuel economy will not be tabulated till the books are closed on 1952, but already there is solid evidence of the magnitude of

the savings these engines can effect. In the acceptance tests, the engines beat all guarantees for gas and pilot oil consumption. At 75 per cent load, the supercharged engine produced a kwh. on 9,030 btu. of gas and 532 btu. of oil, a total of 9,562 btu. At 100 per cent load, this engine used just 8,712 btu. of gas and 367 btu. of pilot oil for a total of 9,079 btu. per kwh. Table II gives the detailed test results for both engines.

The test results and actual experience with the engines in the first months of operation uphold the engineers' cost estimates. With fuel costs under 4 mills per kwh., it is calculated that total generating costs will be only 6.6 mills. This compares with the previous power cost of 15.66 mills with diesels, the 12.91 mills paid for utility power and the projected rating of 20 mills for purchased power. The annual saving will be in excess of \$50,000. It is estimated that production will be 5,700,000 kwh. in 1952 and will top 7,200,000 by 1958. The calculations show that net revenue after payment of fuel, lube and labor costs will be above \$129,000 in 1952 and over \$154,000 in 1958. The money for the expansion of the power plant building and purchase of the new generating units was



List of Equipment

Engines—One 1610 hp., 8 cylinder, 16x22, four-cycle, 327 rpm., Model FSG-165-SC supercharged Nordberg Dualfuel engine. One 1165 hp., 8 cylinder, 16x22, four-cycle, 327 rpm., Model FSG-168, normally aspirated Nordberg Dualfuel engine.
Generators—General Electric.
Governors—Woodward.
Fuel oil—Shallow Water Refining Co.
Unloading pump—Blackmer.
Transfer pump—Viking.
Fuel filters—Nugent.
Injection pumps—Bendix-Scintilla.
Gas meters—Emco-Rockwell.
Gas regulators—Fisher.
Lubricating oil—Sandard HD 30. Standard Oil Co.
Lube filters—Midwest.
Lube coolers—Ross.
Cylinder lubricators—Manzel.
Jacket water pumps—Ingersoll Rand Co.
Cooling tower—Diesel Service Co.
Air filters—Air Maze.
Turbocharger—Elliott-Buchi.
Exhaust silencers—Maxim.
Exhaust pyrometer—Alnor.

TABLE I

Year	Kwh. Generated	Kwh. Purchased	Total Kwh.	Peak Load
1942	1,093,200	2,365,340	3,458,540	600
1943	2,000,800	1,550,040	3,550,840	650
1944	1,860,000	1,599,600	3,459,600	700
1945	2,214,600	1,514,400	3,729,000	800
1946	2,743,400	1,534,200	4,277,600	900
1947	2,633,600	1,999,200	4,632,800	950
1948	2,268,600	2,657,400	4,926,000	1000
1949	2,179,000	2,970,600	5,149,600	1100
1950	2,386,800	2,883,000	5,269,800	1200
Totals	19,380,000	19,073,780	34,453,780	1200

The supercharged Nordberg engine, at right, is rated at 1610 hp. and the normally aspirated unit, at left, produces 1050 hp. It is equipped with oversize generator to permit supercharging at a later date.

In planning the recent plant expansion, the city and its consulting engineers chose to invest in operating economy and long-range dependability. The prime movers are heavy-duty engines of conservative speed and rating. Complete accessory equipment produces maximum protection to the engines. The same 29-gravity low-sulphur diesel fuel is used throughout the plant, both for diesels and as pilot oil for the Nordberg dual-fuel engines. Natural gas is contracted for on a firm basis at a rate of 20 cents per mcf. plus a demand charge which has brought the average price of about 27 cents per mcf. The gas is metered at the incoming pressure of 30 lb. and goes to the turbocharged engine at 15 lb. and to the normally-aspirated unit at 7 lb. If the gas supply should fail, the engines would switch over automatically to oil operation. If pilot oil fails, the gas supply is cut off. All engines are tied together in a single cooling system. Three motor-driven 650 gpm. centrifugal pumps circulate soft jacket water through all engine jackets. If one of the new engines is operating alone, one pump is enough to serve the engine and keep all the others warm. With this arrangement, all engines are always ready for a quick start. The jacket water passes through coils in a new forced draft cooling tower with a rating of 9,000,000 btu. per hour. Three motor-driven turbine pumps handle raw water at the tower. Pumps and fans are controlled by automatic, thermostatic switches. A deep well pump provides make-up water which is treated in a zeolite softener. An effort is made to have all fluids enter the engines at the same temperature. Lube and jacket water are kept at the same level and water coils in the fuel day tanks bring fuel temperature to approximately the same level. Engine air is drawn through oil bath filters located seven feet off the ground on the north side of the plant where the air is likely to be coldest. The air throttle valve can be adjusted manually. Exhaust gases vent through vertical silencers. A convenient gauge panel on each dual-fuel holds pressure gauges and an exhaust pyrometer. Engines and accessories are all on the same level and can all be reached with the two monorail hoists.

This plant was designed with meticulous care and is operated accordingly under my direction as superintendent. The Department is supervised by a Power Board which includes Mayor E. A. Thaxton, City Treasurer Frank Vandiver, Ben Faucett, William Bush and Fred Sisk. D. A. McAfee is City Clerk and Oakley Wade, City Attorney.

With the new plant in service, the power company has offered to retain the old interconnection without standby charge, demand charge or contract, and will make power available at 3.5 mills per kwh. off peak and 10.5 mills in peak periods. The city has agreed to sell power to the utility in emergencies at the same rates. That is the kind of arrangement available to cities capable of meeting their own requirements. With the new, efficient Nordberg dual-fuel engines providing for all anticipated demand for years to come, Las Animas can face its own power future with assurance.

accomplished by selling additional revenue bonds.

The bond payments and interest of approximately \$30,000 per year plan to be made from anticipated savings that the new generating units will make. The fact that so much can be expected of a plant of this modest size is attributable to two principal factors: The ratio of the load and the efficiency of the plant. The ratio of average load to peak load at Las Animas is unusually favorable with annual

load factor ranging from 53 per cent to 65 per cent. All elements of the load end to balance each other. For example, there is a heavy irrigation load during the summer months when residential and commercial lighting are low. The big veterans' hospital has its heavy demand from 10 a.m. to noon when other load is light. With a normal load factor, Las Animas would need nearly double the generating capacity to handle the same kwh. production.

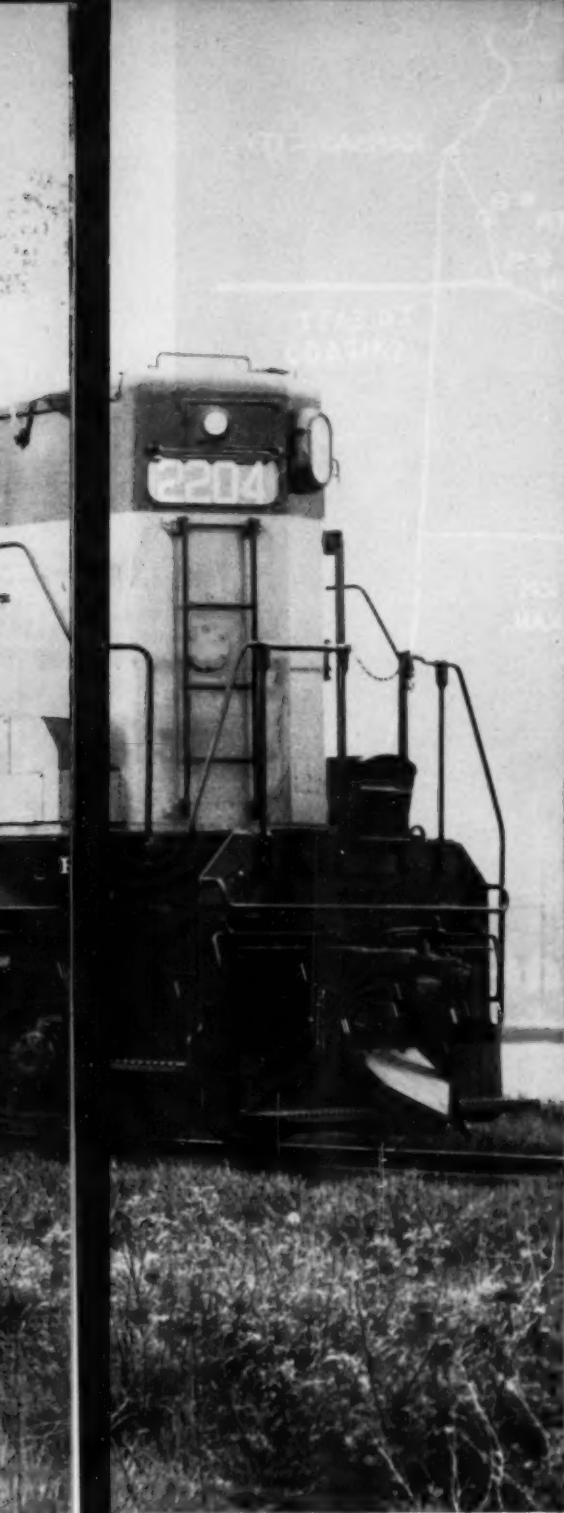
TABLE II
ACCEPTANCE TESTS BY ROCKY MOUNTAIN ENGINEERING CO.
November 1, 1951 — Ernest C. Porter, Chief Engineer.
BTU'S PER KWH. AT 3900 FT. ALTITUDE
Natural Gas: 840 Btu. per cu. ft. Fuel Oil: 19,400 Btu per lb.

% of Load	GAS		OIL		TOTAL	
	Claimed by Co.	Actual Test	Claimed by Co.	Actual Test	Claimed by Co.	Actual Test
For Model FSG 168-SC Supercharged Nordberg Engine						
50%	10,530	10,474	945	810	11,475	11,284
75%	9,440	9,030	625	532	10,065	9,562
100%	8,840	8,712	465	367	9,305	9,079
For Model FSG 168 Non-Supercharged Nordberg Engine						
50%	11,968	not tested	1,462	not tested	13,430	not tested
75%	10,125	9,937	961	708	11,086	10,645
100%	9,285	9,366	719	558	10,004	9,924



MILWAUKEE RAILROAD GETS FIRST TYPE EMD-SD7 ROAD SWITCHER

By CHAS. F. A. MANN



FIRST NEW SWITCHER

AUGUST 1952

EVER since the diesel locomotive became part and parcel of American railroading, the pressure has been put on diesel locomotive builders to build this and that kind of a special job to do special work for some railroad that feels its problems require special consideration and that unless their idea of a specially designed diesel can be evolved, they'll continue old, lightweight steamers in service.

Announcement was made June 2 by Electro-Motive that the first of its new type road switcher, the SD7, was finished and delivered to Chicago, Milwaukee, St. Paul and Pacific Railroad to end for all time the problem of getting a relatively inexpensive diesel of high tractive power that would safely navigate branchlines with light rail and slender bridges. No better railroad exists than the Milwaukee to utilize a type of diesel such as the SD7, because of its extraordinary amount of long branchlines reaching out into its far-flung agricultural and forest country.

The final evolution of the road-switcher diesel as exemplified by the newest EMD creation, hinges on eliminating the bugs of trying to make the stiff, heavy trucks normally used in yard or mainline work, function safely and deliver the highest output on lightweight branchlines largely built of old relayer rail and light timber bridges and trestles. After all there's no use in spending a fortune in building a heavy-duty railroad into territory generating seasonal or normally light, but steady traffic down to the mainline junction. It is sound economics to have these branchlines cut to fit the cloth that represents their overall contribution to the financial stability of the railroad stuck with it.

In characteristic General Motors fashion, the SD7 was evolved as a composite of the sum total needs of all of America's far-flung, seldom seen railroad branchlines. Using the same basic frame and cab design that road-switchers have gradually evolved, and the standard 16 cylinder 567 diesel, with the D12 generator and AC accessory drive found in the FP freight and GP7 road switchers, EMD has gone to work on a flexible truck design that permits 3 traction motors, 6 in all, giving full power on all drive wheels, great accessibility, particularly of the middle motor, and a flexible coil springing system at the four corners of the trucks, borrowed from the Buick automobile. This is EMD's first 6-motor diesel unit. The result is a heavy duty locomotive with tractive power at 25% adhesion way up to 75,000 to 90,000 lbs., and a weight per axle down to 50,000 lbs. in the bare freight unit, devoid of extras and heating boiler setup.

The SD7 is offered in 6 standard gear ratios, ranging from the 65:12 which would deliver a maximum tractive effort at lower speeds, on up to a 58:19 which will permit safe speeds up to 90 miles an hour on straightaway with lighter loads. One version will permit operation with heavy loads in the mountain branches, at high output and low speeds, while the others will permit timetable schedules on secondary main lines with shippers or passengers and mail waiting at the various depots!

Great care and precise designing have been put into the new GM-EMD road switcher, and it is already evident that it will find an immediate wide acceptance in the country, what with more than 600 branchline schedules from Maine to Idaho being operated on antique steam teakettle routines because existing road switcher diesels are still too heavy and rigid and unsafe to operate on the lightweight branchlines. The flexible truck not only permits riding rough track with ease, and no danger of overturning rail, but it permits unusually short radius on curves and switches, and less back-aches for the engine crews. Each truck has four sets of double coil springs placed in pockets in the truck frame with full snubber controls, which permits each pair of wheels free riding and full contact with the rail at all times. Adhesion to the rail under load is greatly improved. Since there are no equalizers in the way, brakeshoes can be changed without putting the locomotive over a pit. The center motor can be serviced by a man in a pit.

Wheel slip control with automatic sanding is provided, new high-capacity dynamic braking optional if the buyer wants it, and full interchangeability of parts with other GM diesels. Automatic transition and the placing of wiring and piping in channels along the side of the platform, plus air-conditioning for the crew, makes this a cory, simple machine to run way "up in the sticks," where normally railroading is somewhat of a pioneering venture for the more hardy crews. The nose can be fitted with a 2500 lb. steam boiler and 1200 gallons of water tankage added if it is to be used in passenger service.

The Milwaukee has more than 2000 miles of secondary mainline and heavy-traffic branchlines in its vast, sprawling system, upon which their initial order for more than a dozen of these new locomotives will be used. Hardly another railroad situation like it in America today.

Weight—Total weight fully loaded (depending upon modifications: 300,000 to 360,000 pounds. Weight per axle: 50,000 to 60,000 pounds.

Tractive Effort—Tractive effort at 25% adhesion: 75,000 to 90,000 pounds.

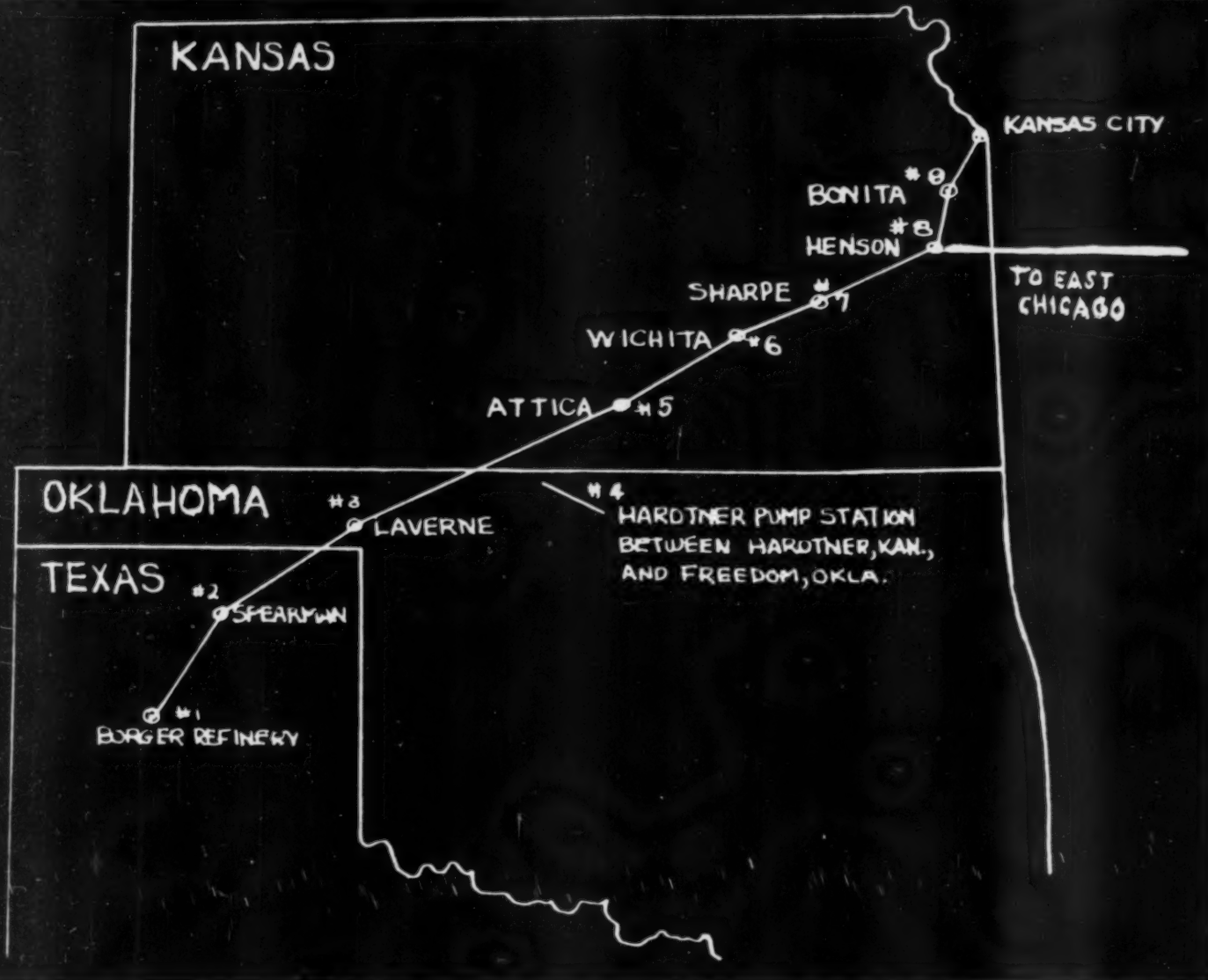
Option	1	2	3	4	5	6
Gearing	65:12	62:15	61:16	60:17	59:18	58:19
Maximum Speed	55	65	71	77	83	89

Dimensions

Over-all length over couplers	60' 8 1/2"
Maximum width over grab irons	10' 8"
Maximum height above rails	15' 0"
Distance between truck centers	35' 0"
Truck rigid wheelbase	13' 7"
Wheel diameter	40"
Minimum curve radius	250' 0"

Supplies

Fuel Oil	1200 gals.
Boiler Water (Optional)	1200 gals.
Lubricating Oil	200 gals.
Cooling Water	260 gals.
Sand	50 cu.ft.



Phillips Products Line from Borger, Texas to East Chicago, Indiana now uses Dual Fuel Engines

By REX W. WADMAN

SHARPE, KANSAS, July 8. The installation of nine Nordbergs on the new Phillips Products Line is an extremely interesting development in the application of supercharged, inter-cooled, 4-cycle, high compression engines to pipe line operation. So, with the active cooperation of Mr. J. W. Boyd, Vice-President, Operations, of Phillips Pipe Line Company, I came up here from Bartlesville this morning to describe the installa-

tion at Sharpe, Kansas as typical of all nine installations.

This modern, efficient equipment was put into service in April, 1952. It is expected to increase capacity thirty thousand barrels per day. Supplying the power for pumping eighty thousand barrels of products a day over this 470-mile span are nine Nordberg Dualfuel diesel engines with a total rating

of 10,890 hp. These engines operate individually in each of nine strategically located pump stations which also house the engines, pumps and accessory equipment for the older line. In addition to Borger, the Nordberg engines are operating in stations at Spearman, Texas; Laverne, Oklahoma and Hardtner, Attica, Wichita, Sharpe, Paola and Bonita, Kansas. The Sharpe station contains, in addition to the 8-cylinder Nordberg that we talk about

Phillips Products Pipe Line, showing pump station locations of the nine Nordberg 4-cycle supercharged Duafuel engines rated at 1210 hp. at 460 rpm. (sea level rating). Henson Station #8 has since been changed to Paola, Kansas.

at length in this article, one Sterling Viking gas engine and two Clark gas engines which operate the original products line from Borger, Texas through St. Louis and into Chicago, with a bypass at Paola, Kansas to Kansas City, Kansas. Currently the new Nordberg has taken over the operation of the "B" line, which is a combination of 8-in. and 12-in. pipe, and in between the nine stations mentioned above some of the smaller and older natural gas engines are used as boosters. The "A" line, or the older product line, uses the remainder of the small natural gas engines. At present the "B" line is transporting natural gasoline, propane and butane, and the Nordberg is using for pilot oil the distillate products from the "A" line. But the natural gas for its operation, and the operation of the smaller engines, is purchased on an interruptible contract. Hence the dual fuel arrangement on the new big engine.

The Nordberg engines are of the four-cycle type, both supercharged and intercooled, and have eight cylinders of 13-in. bore and 16½-in. stroke. They are each rated 1210 hp., at 460 rpm. Each engine drives a six-stage centrifugal pump through a speed increaser with a ratio of 1:8.024 (460 to 3691 rpm.)

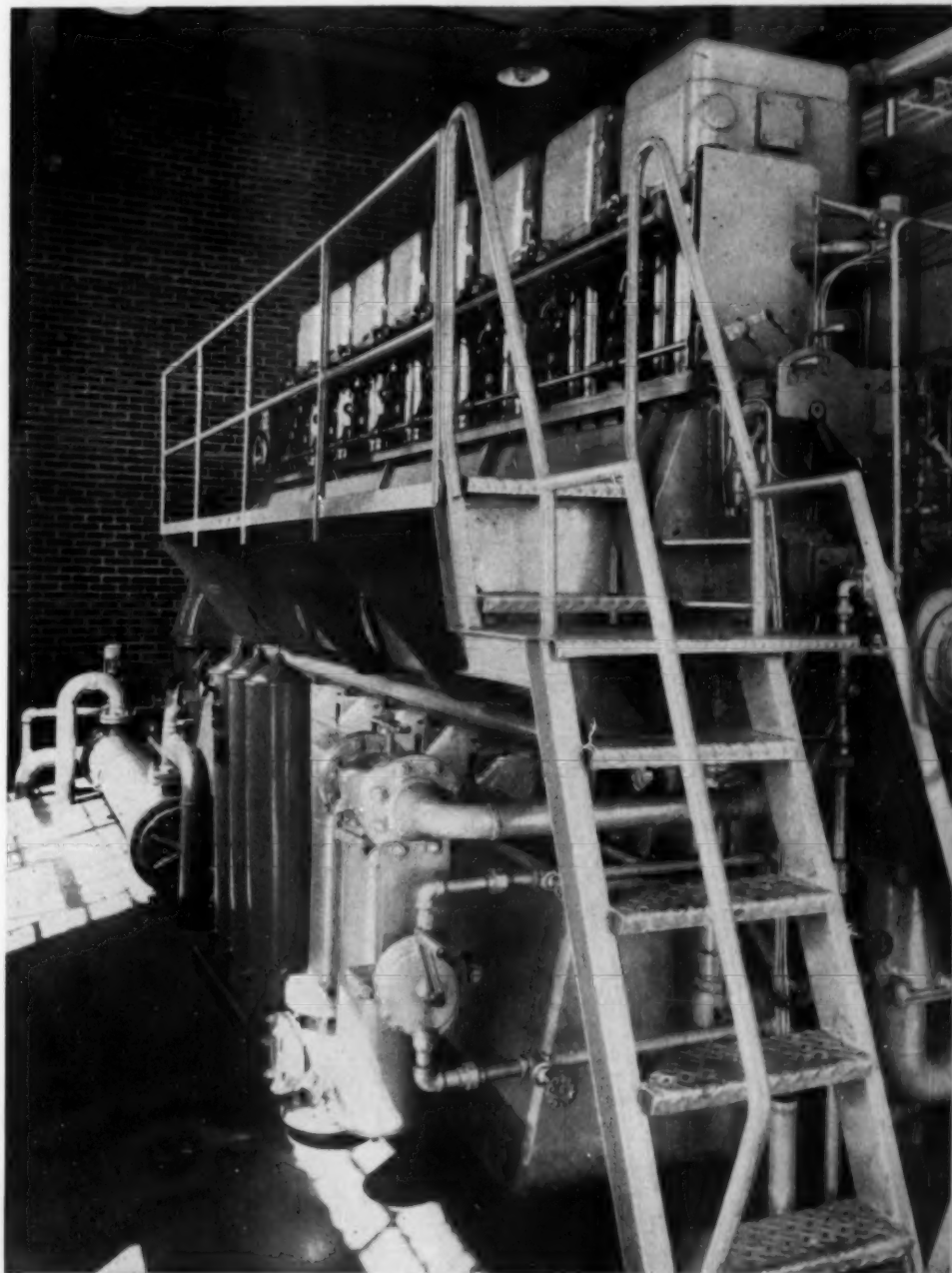
Engine speed is handled by a hydraulic governor which is pneumatically controlled by air pressure from a controller actuated by suction pressure on the pipeline pump. With this system a variable rate of flow is automatically controlled. One of the most important features of this entire operation is the great flexibility that has been assured through the installation of the Nordberg units.

Currently the Nordberg engines are operating on the Duafuel principle burning natural gas with a small quantity of pilot oil to initiate combustion. They are, however, convertible for operation on natural gas with spark ignition, which allows Phillips a great latitude of operation. These engines incorporate an intercooler and the auxiliaries have been installed with sufficient capacity for converting the engines at a later date to Supairthermal operation. This will provide twenty-five per cent additional power when increased capacity is desired. The Duafuel engine and the straight diesel engine are basically the same design. The only difference lies in the addition of connections and regulating mechanisms to allow the engine to operate on gas and pilot oil, fuel oil, or a combination of gas and oil. By referring to the schematic diagram of Duafuel operation, it will be seen that these additions are as follows: (1) The camshaft has one extra cam per cylinder to operate the gas valve in

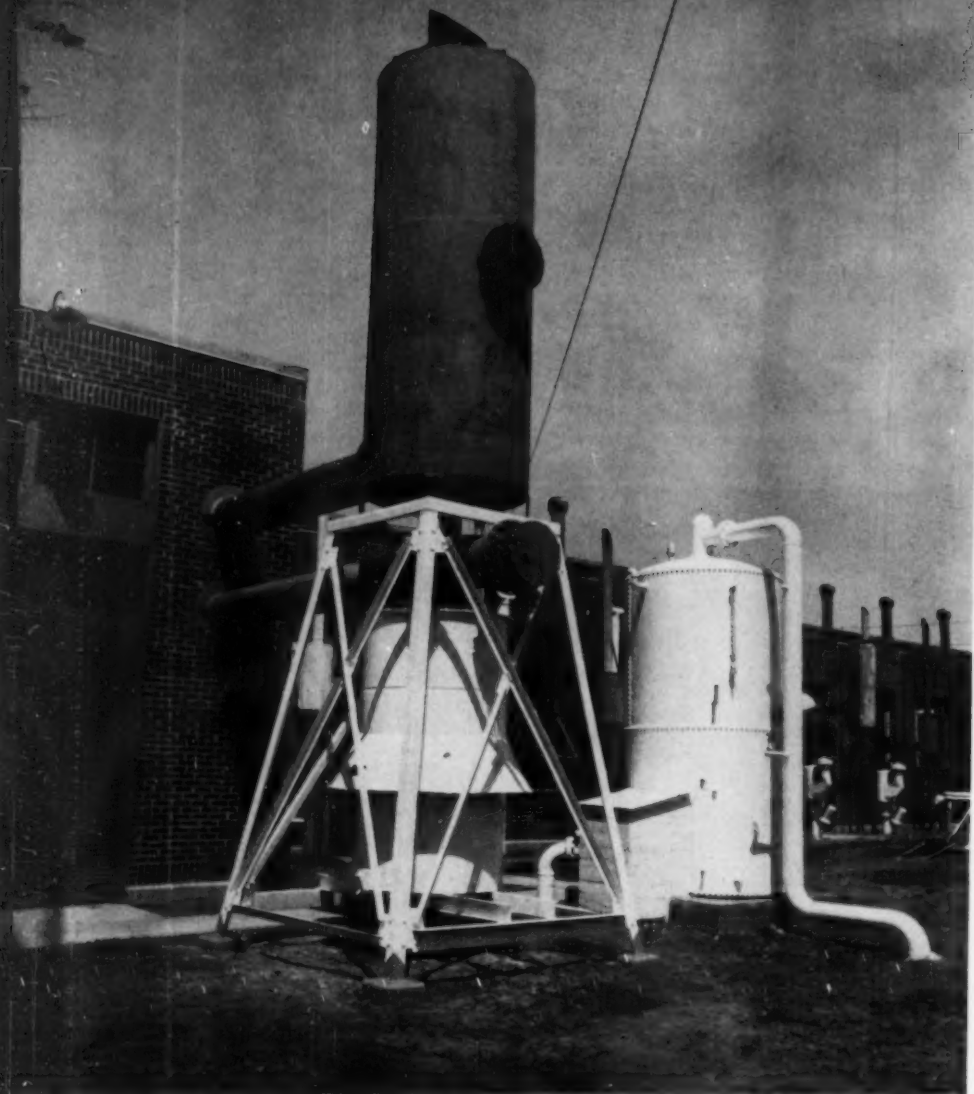
the cylinder head; (2) This cam has a follower and a hydraulic actuator in the case of the 13-in. engine, which transfers the action of the cam to the gas valve in the cylinder head; (3) Each cylinder head has one extra valve, the gas valve, to admit gas into the cylinder; (4) A gas header with equalizing valves carries the gas to the gas valve in the cylinder head; and (5) there are three other gas valves controlled by either the governor or other operating levers through linkage or hydraulic action to regulate the amount of gas going into the gas header. It is necessary to use pilot oil in conjunction with gas because the compression within the cylinder is not sufficient to ignite the gas. However,

it will ignite the pilot oil and this in turn will ignite the gas.

The control levers, "A" and "B" are used for starting, operating and stopping the engine. The setting of control lever "B" determines whether the engine operates on fuel oil, gas, or a combination of the two. In this position, control lever "A" is in line with the sector marked "Stop" on the control face plate. Control lever "B" is in the sector marked "Oil" on the control face plate. Lever "A" holds the fuel pump rack regulating shaft "D" in the OFF position through Arm "P." The gas is shut off not only through linkage "F" and valve



Quartering view of the Nordberg Duafuel, supercharged, intercooled 8-cylinder unit as installed at Sharpe, Kansas pipe line station at Phillips Pipe Line Company. Note Purolator lube oil strainer in foreground, Hilliard Hy-flow oil filters, followed by Ross heat exchanger in background, controlled by Fulton-Syphon regulator.



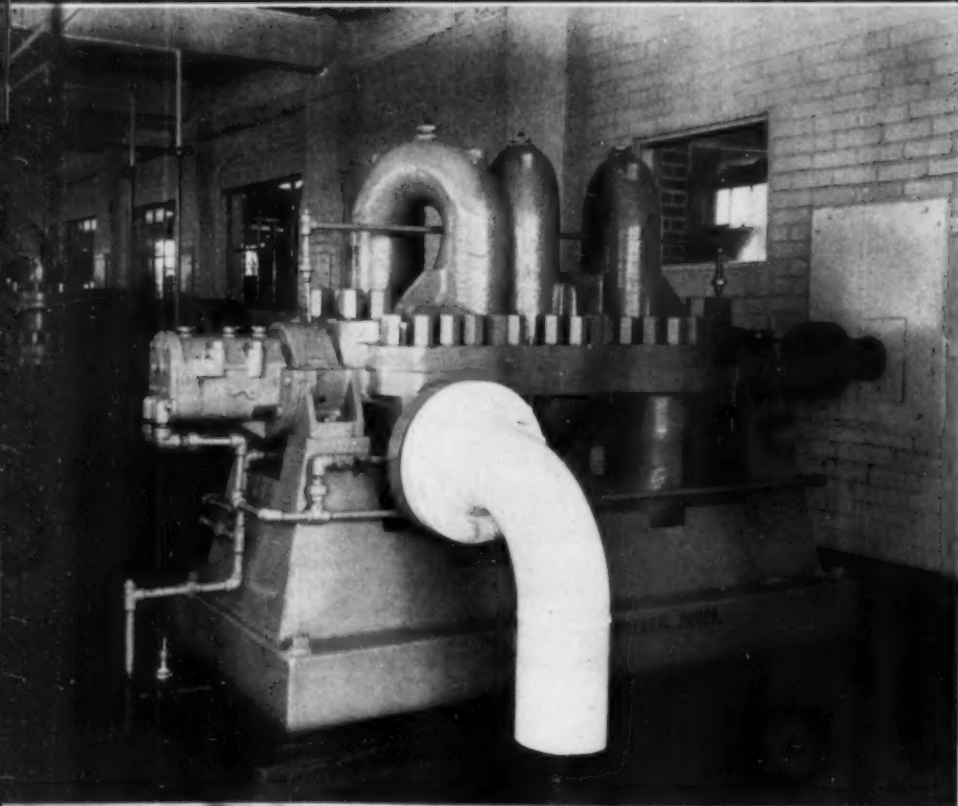
◀ The Burgess Snubber with the American Cycoil air filter underneath, as installed in connection with each of the nine Nordberg supercharged, 4-cycle Dualfuel engines on this Phillips Pipe Line.

"G," but also when control lever "A" is in the STOP position. Lever "H" holds down valve "I" which bypasses the fuel oil normally holding valve "J" open, thus closing valve "J." This action positively shuts off the gas from the engine. The air shut-off valve "K" is also closed allowing no starting air to the starting air header. If the engine is running and it is desired to shut down, move lever "A" to the STOP position. This automatically pulls lever "B" into the oil range.

To start the engine, pull the control lever "A" into the sector on the control face plate marked START. The control lever "B" is already in the sector marked "Oil." It is always advisable to start the engine on oil. Movement of the control lever to this position opens the starting air shut-off valve "K" through linkage "L" and allows starting air to enter the starting air header. At the same time starting air is allowed in the air header, air is admitted to the starting air distributor "M" driven by the engine camshaft which times the opening and the closing of the starting air valves. At least one passage through the distributor is open and allows air through the pilot air pipe to the top of the piston of the starting air valve "N." The air pressure, being greater than the spring tension, opens the starting valve and allows starting air into the cylinder. When the engine has made two or three revolutions, the operator pulls the control lever "A" back to the RUN position. During this time fuel is being injected because arm "R" no longer holds the fuel rack in the OFF position. Therefore the engine starts to run on oil. The gas valve "J" is open since lever "H" no longer holds down valve "I." However, no gas is admitted to the header because lever "B" is in the oil range and holds valve "G" closed.

The moving of lever "A" out of start position allows the starting air shut-off valve to close, stopping all air to the air header. With lever "B" in the oil range the governor can regulate the fuel racks by cam "O" and the follower and arm on the regulating shaft. This determines how much fuel is being injected and thus regulates the speed of the engine for a particular load.

If, after the engine is started, gas operation is desired, the operator can move the control lever "B" over to the sector on the face plate marked "Gas," "100." In this position linkage "F" opens valve "G" allowing gas to enter up to valve "Q." At the same time the cam on lever "B" moves arm "C" which, through linkage "E" moves the regulating shaft "D" and places the fuel racks in their pilot



◀ The United Centrifugal Pump made by United Iron Works of Oakland, California, which is direct connected through a Thomas Flexible Coupling through the wall to another Thomas Flexible Coupling and into the Westinghouse speed increaser, and thence to the engine. This pump installation is typical of the nine pipe line stations herein described.

Schematic diagram showing the dual fuel operation similar to each of the nine Nordberg 8-cylinder, 4-cycle, supercharged, intercooled, Dualfuel engines installed by Phillips on its new Products Line running from Borger, Texas to Kansas City, Kansas. The linkage arrangement on the governor differs from that shown.

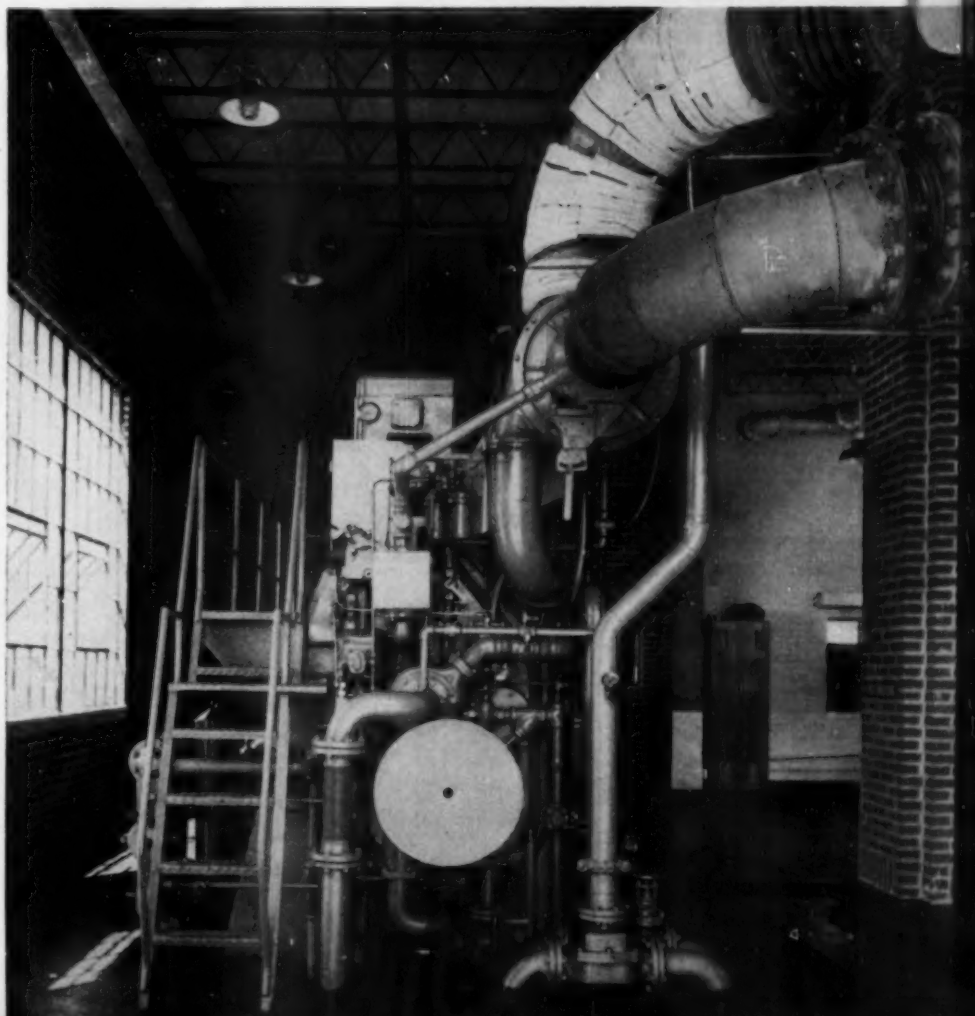
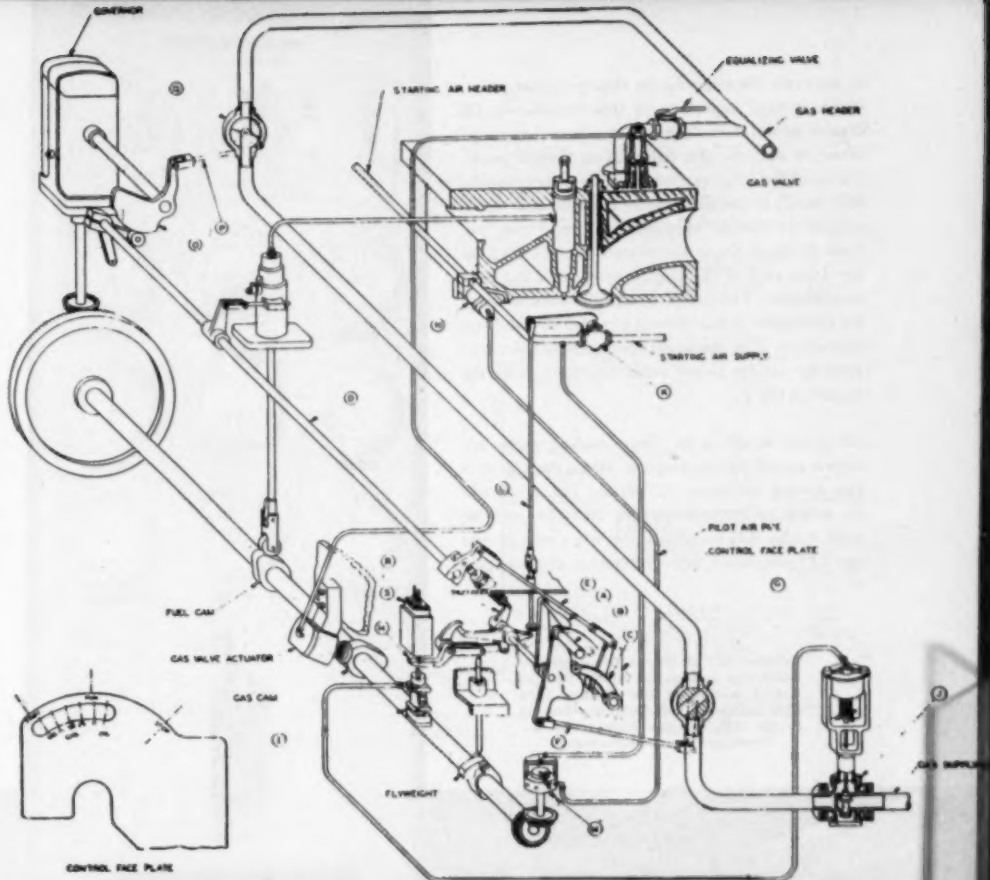
oil position. This motion of the regulating shaft pulls the follower and arm off cam "O" so that the governor does not control the fuel. Now, however, the governor through linkage "P" controls the gas valve "Q" regulating the amount of gas going into the gas header. If it is desired to run on half gas and half fuel oil, lever "B" is placed in the range marked "Gas" "50." In this position valve "G" is partly closed, the fuel racks are set at half fuel capacity and the governor regulates the additional gas needed through valve "Q." The same applies to the other ratios of gas and fuel oil desired. The Woodward Co. PG governor incorporates a device for low lubricating oil pressure shutdown.

A fly weight is attached to the camshaft which, at excessive speeds of the engine, trips lever "H" which shuts down the engine. An equalizing valve is provided in the gas line from the gas header to each gas valve for the respective cylinder. This valve is adjusted manually to balance the load between the different cylinders. Once the cylinders are balanced the equalizing valves are not re-adjusted. These valves are necessary because of the pulsations created in the gas header during the opening period of the gas valves for the respective cylinders.

Cooling of the jacket water on the Nordberg engines is accomplished by a pipeline heat exchanger using the product as a cooling medium. This exchanger, installed on the suction side of the pump, cools the water from the engine to 90°F. at which temperature it is pumped to the intercooler. This intercooler, of the two pass type, then reduces the intake manifold air temperature from the turbocharger to 105°F., thirty-five degrees less than the normal rating of a low pressure supercharged engine. This permits the engine rating to be increased 10.5%. Constant pressure is maintained by a surge tank located before the engine driven water pump.

Automatic control of this cooling jacket water heat exchanger is handled by two Amot thermostats which are unique in this respect. They are preset at the factory in Richmond, California for the temperature at which they are to operate and control, and once installed they can be relied on

End view of the 8-cylinder, dual fuel Nordberg installed in each of the nine Phillips Pipe Line stations, showing the 4-in. Amot automatic thermostat on the ground at bottom right. Immediately behind it is a 2½-in. Amot automatic thermostat. Above it, and in the approximate middle of the engine is the Fulton-Sylphon dual fuel control, which is illustrated in the schematic drawing above. Zallee exhaust expansion joints top right, and also on the water line left foreground.



to maintain the temperature exactly at that point, which is very important in this installation. Of course, should it be desirable at a later date to increase or decrease this temperature control point, the manufacturers can supply a new thermostatic unit which is installed inside the case and is not subject to outside manipulation from then on. Two of these Amot thermostats are installed on the front end of the engine in each of the nine installations. The main automatic control valve for the engine jacket water is a model 4B-160 Amot thermostat. This thermostat is set to hold the temperature of the jacket water emerging from the engine at 160°F.

All of the details in the entire cooling system are shown on the piping diagram. When the engine is first started up, outlet "C" on the 4-in. Amot will be closed off entirely because the water will be cold. Under this condition, the water will go into the "A" connection and will emerge at the by-pass

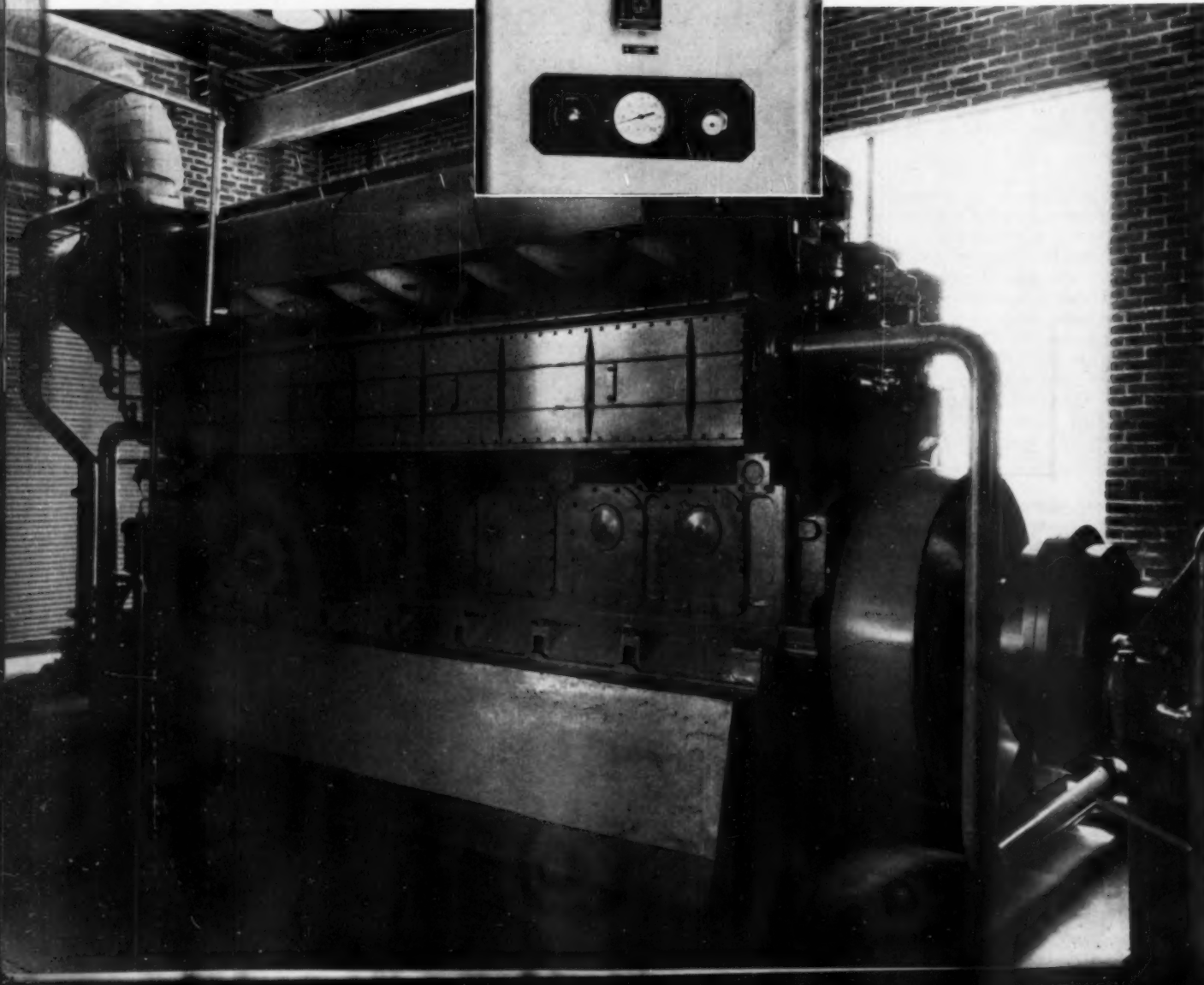
Exhaust side of one of the 8-cylinder Nordbergs as installed in the Sharpe, Kansas station of the Phillips Pipe Line Company. Falk Coupling showing to the right as the shaft enters the Westinghouse speed increaser.



or "B" outlet. Therefore, under the cold condition, all of the circulating water in the engine will by-pass the main jacket water cooler, and rapid warm-up of the jacket water will result. When the engine jacket water outlet temperature going to the "A" connection reaches a temperature of 155°F., outlet "C" will just start to open slightly, and by-pass outlet "B" will just start to close off slightly. At 160°F. the elements in the thermostat housing are proportioning the water flow so that 200 gpm. of water flow through the by-pass line from "B" and 100 gpm. of water flow to the main jacket water cooler from "C." At the tee connection marked "T" on the piping diagram, the by-passed water is blended with the cooled water that flowed through the jacket water cooler to produce a jacket water inlet temperature to the engine of 147°F. under full load conditions.

On the piping diagram are shown the running temperatures under full load conditions. Under

The control panel for each of the nine engines on the Borger, Texas to East Chicago, Indiana, Phillips Pipe Line, showing Viking alarm controls top left, Alnor pyrometer top center, and Weston manometer. Other instruments are by Lonergan.



Cooling system under full load conditions for the Nordberg Dual-fuel engines in each of the nine Phillips Pipe Line stations.

part load conditions, the engine jacket water outlet temperature will still run approximately 160° F. However, the jacket water inlet temperature will run somewhat higher than the 147°F. inlet temperature shown for full load conditions.

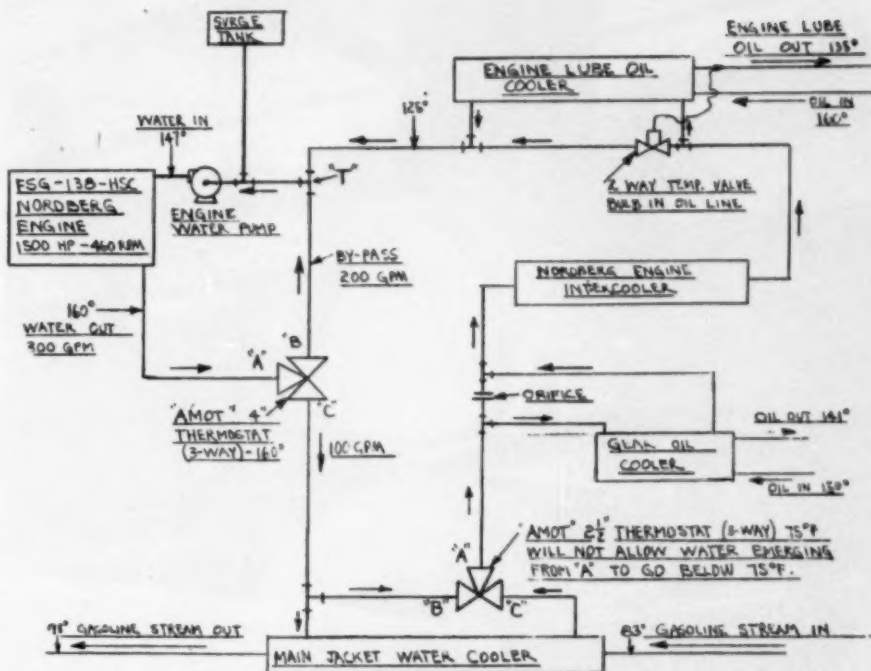
A Model 2½B-75 Amot thermostat is used at the main jacket water cooler so that the water emerging from this point and going to the auxiliary coolers, such as the gear oil cooler, intercooler, and lube oil cooler, will never get to a temperature below 75°F. Under normal conditions with the water emerging from "A" on the 2½-in. Amot at a temperature of say 120°F., connection "B" will be entirely closed off, and all of the water will enter at "C" and will emerge at "A." Under winter conditions the water emerging from the jacket water cooler may be very cold. When the temperature of the water emerging from "A" of the 2½-in. Amot descends to a temperature of 82°F., the "C" connection will start to close off, and at the same time connection "B" will start to open. At 75°F. connection "B" will be open a substantial amount and water will flow into both "B" and "C" and will emerge at "A." At temperatures of slightly below 75°F. "C" will be practically closed off and most of the water will go through "B," thus the jacket cooler will be by-passed almost entirely under this condition.

As shown on the piping diagram the main jacket water cooler utilizes the product going through the pipe line as a cooling medium. The gear oil cooler, engine intercooler and the engine lube oil cooler all utilize the engine jacket water as a cooling medium.

Getting back to the Nordberg itself, the principal equipment is listed on the attached table. The features of the alarm panel give jacket water temperature, starting air pressure, gas pressure, turbo-charger air pressure, turbocharger lube oil temperature, fuel oil pressure, and lube oil pressure.

Mr. J. O. Richardson of the Phillips Pipe Line Department in Bartlesville drove me up here to Sharpe, Kansas and was very cooperative in supplying technical details. Mr. Irving Bomford, official photographer for Phillips also came along, and took the very excellent photographs used in this article. The capable Chief Engineer of this Sharpe station is Mr. C. D. Traywick, who has been with the Company for over a quarter of a century. I am very appreciative of the cooperation extended to me by all of Phillips personnel in visiting this typical pipe line station, and in being able to bring to you, our readers, this interesting application of a 4-cycle, supercharged and intercooled diesel engine. It was a happy thought initially, and it is working out splendidly in practice.

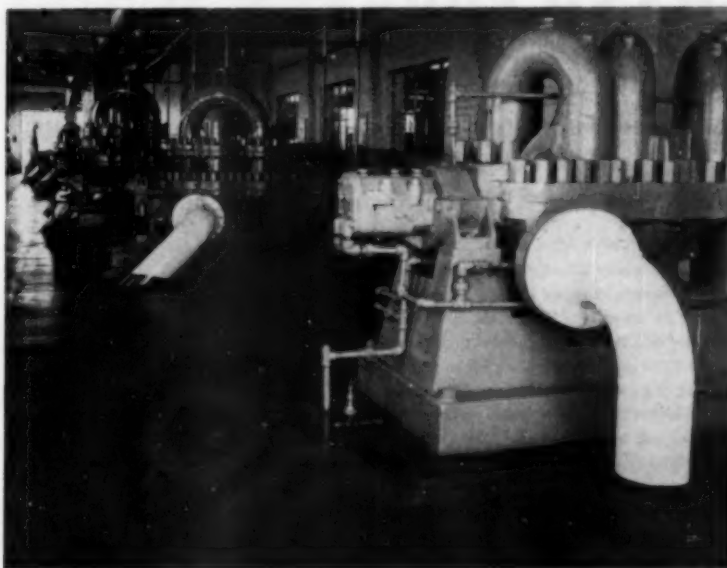
General view of the pump room at Sharpe, Kansas, with the Nordberg driven pump in the foreground and the Sterling and Clark driven pumps in the background.



List of Equipment

Engine—Nine FSG-138-ISC four-cycle supercharged, intercooled, eight cylinder 13 in. x 16½ in. Dual-fuel diesel engines. Nordberg Mfg. Co.
Centrifugal Pumps—Nine Model 6 in. BFH. six-stage, United Iron Works.
Coupling between engine and gear—Falk.
Speed increasers—Westinghouse.
Couplings between gear and pump—Thomas.
Lubricating Oil Filters—Hilco. Hilliard Corp.
Lubricating Oil Coolers—Ross Heater & Mfg. Co.
Lube Oil Temperature Regulator—Fulton Sylphon.
Lubricating Oil Strainers—Purolator.
Lubricating Oil Thermometer—Weston.

Lubricating Oil Pressure Gauges—Lonergan Co.
Fuel Oil Filter—Nugent.
Fuel Pumps—Boach.
Automatic Fuel Switch—Fulton-Sylphon.
Alarm System—Viking Instruments, Inc.
Exhaust Silencer—Burgess Manning.
Exhaust Pyrometer—Alnor, Ill. Testing Labs.
Governor—Woodward.
Turbochargers—The Elliott Company.
Indicator Valve—Bacharach.
Pressure Indicator—Bacharach.
Amot Thermostats—One 4 in., one 2½ in. per engine. American Motors Co.
Jacket Water Cooler—Western Supply Co.





GRAND FORKS, N. D. REA

Five 1600-hp. Fairbanks-Morse Opposed Piston Engines Installed in Record Time Help REA Cooperative With Peaking and Standby Services

AN 8,000 horsepower diesel plant, built in a few short months to meet urgent power requirements of the Minnkota Power Cooperative, today can be put on the line in a few short minutes to meet emergencies and to help the steam turbines carry the rising peak loads. This emergency plant at Grand Forks, North Dakota, which today performs a daily service, consists of five 1,600-hp. Fairbanks-Morse opposed-piston diesels. All five of these engines were in full operation just four months and three weeks after ground was broken for the plant. Minnkota was formed in September 1940 to generate power for ten distribution coop-

eratives in the Northeastern portion of North Dakota and the Northwestern portion of Minnesota. The area to be served included the famed Red River Valley and adjacent lands totaling 40,000 square miles. By the end of 1951, the system was providing electricity to 37,000 farm homes over 1,137 miles of 69 kv. line and 23,000 miles of low voltage distribution line. Peak load had reached 30,000 kilowatts.

The beginnings of this great system were modest and early development was slow. Generation started at Grand Forks in September 1941 with



These five 1600-hp. Fairbanks-Morse opposed-piston diesels were all in service less than 5 months after ground was broken for the plant. Each unit drives an 1136 kw. F-M alternator. The Air-Maze filters are mounted on the engines.

three 1,000-hp. Cooper-Bessemer diesels. These were supplemented in 1945 and 1946 with three 1,437-hp. supercharged diesels of the same type. In November 1947, Minnkota put into service three 2,200-hp. Hamilton diesels in a plant at Harwood, N. D. Then the expansion program went into high gear and construction was started in 1948 on a big steam turbine plant at Grand Forks. But the first turbine was not scheduled to begin operation before the end of 1949 and load expansion would not wait for this enlargement of generating facilities. By the end of 1948, it was clear that Minnkota either would have to get additional prime movers in a hurry or would have to curtail services.

On New Year's Eve, Minnkota Manager Andrew L. Freeman and his associates set in motion an incredible timetable with a telephone call to determine the availability of diesel engines. On January 2, 1949, additional calls were made to equipment manufacturers, the Rural Electrification Administration in Washington, and to Ellerbe & Company, consulting engineers. Conferences were held with REA in Washington between January 25 and 29 to arrange financing of the project. On February 14, Ellerbe & Company announced at a meeting of the Minnkota Board of Directors that plans and specifications of the new plant had been completed

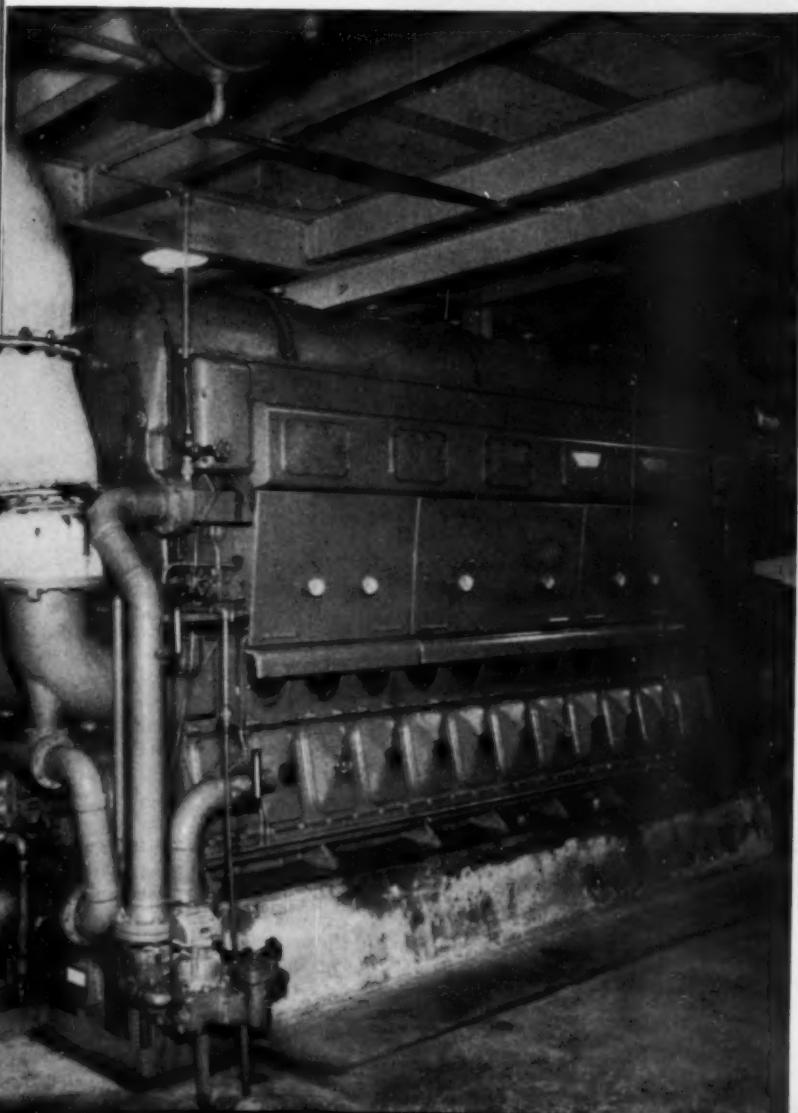
and that bids were being called for on March 1. The rising load curve intensified pressure for rapid accomplishment and excavation for the new plant was started on February 24 even before all the bids were in. Approval of the Kehne Electric Company bid was announced on March 14 and the project was in the clear.

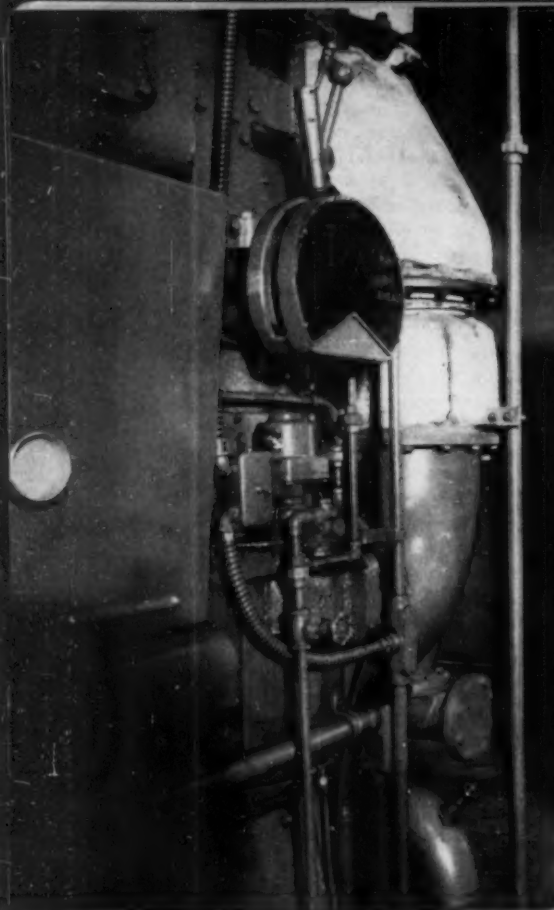
On May 17, just two months and three weeks after the start of excavation, the first diesel was put into service. On July 15, just four months and three weeks after ground was broken, all five engines were in operation. From the first telephone call to full plant operation, the project consumed just six and a half months. There is no evidence in the completed plant that this was an emergency job, designed and constructed in record time. In prime movers and arrangement of accessory equipment, the plant is carefully designed for efficient, trouble-free operation. The quick-starting diesels are specially suited to the emergency service which is one major function of the plant.

This view of Minnkota's five F-M diesels shows the Fairbanks-Morse jacket water pumps, the main lube pumps, the Liquidometer day tank level meters and the Pittsburgh fuel meters. Note how little head room is necessary for servicing the opposed-piston engines.

The five heavy-duty diesels are identical Fairbanks-Morse opposed-piston engines, each with 10 cylinders, 8 1/4-in. bore and 10-in. stroke, developing 1,600 hp. at 720 rpm. Each drives a 1420 kva.- 1136 kw., 3-phase, 60-cycle, 2400/4160 volt F-M alternator with 10 kw. V-belted exciter. The diesels use a Texas crude oil of 26 to 28 gravity delivered by tank car and stored in four tanks with combined capacity of 132,000 gal. The fuel is heated with steam from the adjoining steam plant and is put through a Fuller's earth purifier and into five 500-gal. day tanks in the plant basement. The day tanks have high and low level alarms. The engine-driven supply pumps take oil from the day tanks through meters and bag-type filters and deliver it to the injection pumps.

The main lube pump on each engine circulates a detergent-type lubricating oil under pressure to bearings and cylinders and to the oil-cooler pistons. Also in the circuit are a full-flow strainer and cooling coils. Part of the oil is bypassed from the pressure system through a 10 cartridge cellulose filter from which it returns to the crankcase. Each engine also is equipped with a motor-driven auxiliary lube pump which can be used in starting and stopping. There is a separate cooling system for each engine. Soft water is circulated by a built-in centrifugal pump through the engine jackets and through coils in an individual evaporative cooler. Zeolite treated spray water is handled by a motor-driven centrifugal pump. Temperature regulation is automatic with thermostatic controls on a jacket water bypass valve and on the cooler's air louvers. Makeup water is drawn from the city mains and treated in a softener. The evaporative coolers also cool the lubricating oil. Scavenging air is drawn through filters mounted on the engine frames. Exhaust gases vent through vertical snubbers outside the plant. Starting air is provided by two motor-driven compressors automatically controlled to keep three air tanks, spaced evenly along the engine foundations, over 200 psi. A gauge board, conveniently located near each diesel, holds a multi-point exhaust pyrometer, pressure and temperature gauges, and alarms on jacket water and lube pressures and temperatures.

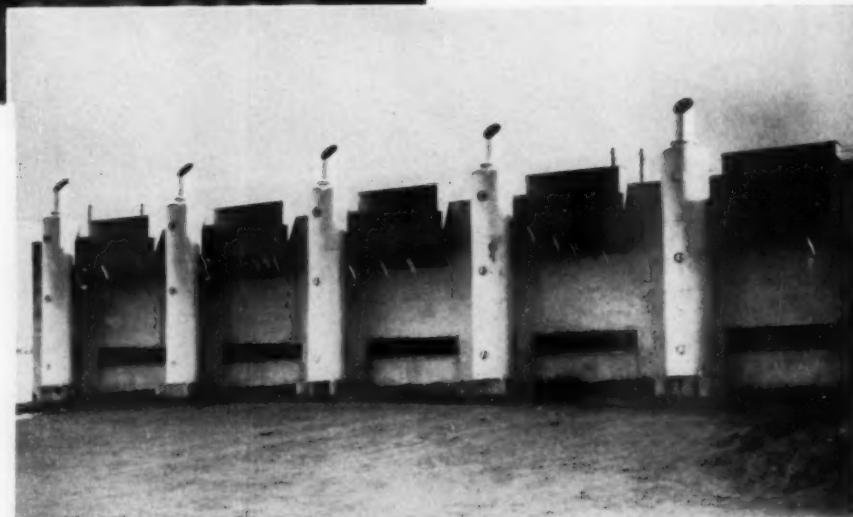
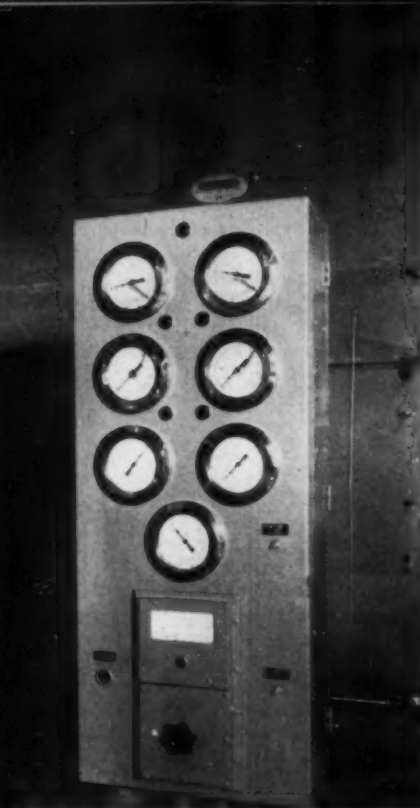




Conveniently located beside each diesel is a gauge board with Marshalltown pressure and temperature gauges and an Alnor exhaust pyrometer.

The five engines accomplished their first mission, joining the older diesels in shouldering the growing load until the turbines could be put on the line. On December 20, 1949, the first 5,000 kw. De Laval steam turbine went into service, followed by a second identical unit in March, 1950. Finally, in April, 1951, the 11,500 kw. General Electric turbine was put to work. But completion of the steam plant did not put an end to the service of the diesels. With peak loads running as high as 30,000 kw., it is evident that all three turbines at capacity could not meet the demand. Diesels are run every day to help carry the peaks.

The diesels also perform an essential service as standby units. This reporter witnessed one impressive demonstration of the speed with which diesels can be put on the line to meet an emergency. Late one afternoon, with the load building up, operators in the steam plant discovered that they could not put the big turbine on the line because of some difficulty with the synchronizer. A man hurried to the adjoining diesel plant and began starting OP engines. Single-handed, he started three units, brought them up to speed, synchronized them and put them on the line in exactly 3 minutes and 20 seconds. When the load required it, he put the other two engines on the line. Less than 15 minutes after he entered the plant, the five F-M diesels were producing 5,500 kw. Peaking and emergency service are not conducive to maximum operating economy or to impressive produc-



List of Equipment

Engines—Five 1600-hp., 10-cylinder, 8½ x 10-in. heavy-duty, opposed-piston diesels operating at 720 rpm. Fairbanks, Morse & Co.
 Alternators—Five 1420 kva., 1156 kw., 3-phase, 60-cycle, 2400/4160 volt alternators with 10-kw. V-belted exciters. Fairbanks, Morse & Co.
 Governors—Woodward Governor Co.
 Fuel and lube oil—Western Oil & Fuel Co.
 Fuel oil steam heater—Ross Heater & Mfg. Co., Inc.
 Clarifier—Briggs Filtration Co.
 Lube oil filters—Fairbanks, Morse & Co.
 Auxiliary lube pumps—Geo. D. Roper Corp.
 Lube oil strainers—Purolator Products, Inc.
 Evaporative coolers—Fairbanks, Morse & Co.
 Cooling water pumps—Fairbanks, Morse & Co.
 Fuel meters—Pittsburgh Equitable Meter Co.
 Fuel level meters—Liquidometer Corp.
 Snubbers—Burgess-Manning Co.
 Air filters—Air-Maze Corp.
 Pyrometers—Alnor. Illinois Testing Lab., Inc.
 Meters—Weston Electric Instrument Corp.
 Alarm indicators—Edwards.

This view of the rear of Minnkota's diesel plant No. 2 shows the five Burgess exhaust snubbers and the air inlets and outlets for the five F-M evaporative coolers.

tion totals but the OP's have a respectable record in both departments. In 28 months from the time the first unit went on the line, the engines have generated 6,041,500 kwh. Fuel consumption has totaled 485,473 gal. for an average of 12.4 kwh. per gal. Lube consumption averages better than 3,000 hph. per gal.

Minnkota is doing an impressive job in providing electricity to a vast, power-hungry region. Affiliated cooperatives which expect to serve a total of 42,000 farm homes include: Cass County Electric Cooperative, Kindred, N. D.; Nodak Rural Electric Cooperative, Grand Forks, N. D.; Sheyenne Valley Electric Cooperative, Finley, N. D.; Cavalier Rural Electric Cooperative, Langdon, N. D.; Red River Valley Cooperative Power Assn., Halstad, Minn.; Red Lake Electric Cooperative, Red Lake Falls,

Minn.; Wild Rice Electric Cooperative, Mahanomen, Minn.; P.K.M. Electric Cooperative, Warren, Minn.; Beltrami Electric Cooperative, Bemidji, Minn.; and Clearwater-Polk Electric Cooperative, Bagley, Minn. Minnkota officers are Victor M. Edman, president; M. S. Swanson, vice-president; and Millard Dailey, secretary-treasurer. The cooperative is managed by Andrew L. Freeman with H. A. Nelson as assistant manager. Directly in charge of power equipment at Grand Forks is Chief Operator George Lorfald. The problem of power supply for so great an area and population is complex; the Board of Directors has conferred on the possibilities of using hydroelectric power from Garrison Dam. Minnkota engineers are confident, though, that there will always be a place in their power system for efficient, dependable, quick-starting diesels.

For proven dependability...

AUTO-LITE

diesel equipment

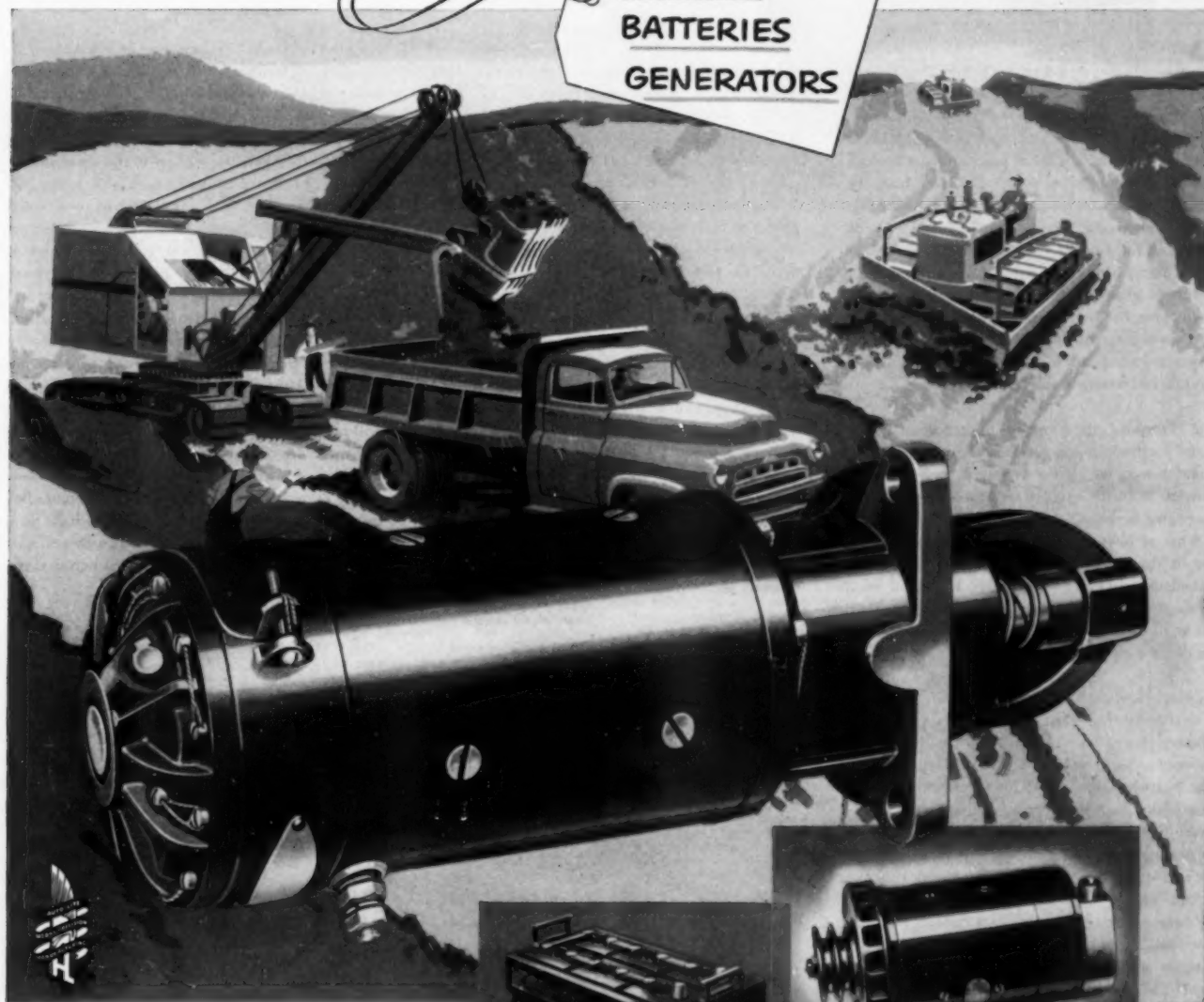
For over 41 years Auto-Lite has been building complete electrical systems for the makers of many of America's finest cars, trucks and tractors. It is this experience that makes possible the outstanding dependability achieved in Auto-Lite Diesel Equipment—from generators to voltage controls—from batteries to starters. This unfailing reliability in service has helped to make Auto-Lite the world's largest independent manufacturer of automotive electrical equipment. If you have a particular diesel problem, Auto-Lite invites you to write to

Toledo 1, Ohio

THE ELECTRIC AUTO-LITE COMPANY

Sarnia, Ontario

STARTERS
BATTERIES
GENERATORS



Tune in "SUSPENSE" . . . CBS Television Tuesdays



WHAT'S GOING ON IN ENGLAND

CONDUCTED BY HAMISH FERGUSON

Hamish Ferguson was appointed secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr. Ferguson continues to do independent consulting work.

PRIOR to the last war, R. A. Lister & Co. Ltd., had decided to introduce a new range of engines which would replace their existing popular and well-tried models with an engine running at higher-speed yet at the same time retaining robustness and durability. The war years caused a hold-up in the development work but the time has now come when the Company is ready to go ahead. The machine shops have been re-tooled and will be capable of turning out 1,000 engines per week. The cost of reorganizing and equipping the factory has amounted to some £250,000. Listers claim that the new engine has been designed and produced, not down to a price but up to a "standard." It meets Lloyds requirements in all respects and embodies a number of unique features.

The "Freedom" series consists of a range of 1, 2, 3, 4, and 6 cylinder high speed oil engines suitable as prime movers in a great variety of trades and industries. With the exception of the single cylinder, the engine develops 9 hp. per cylinder at 1800 rpm. or 8 hp. at 1500 rpm and is thus suitable for coupling to alternators of 60 and 50 cycles. The Lister "Freedom" engine is sturdily built and of good appearance. The working parts are totally enclosed but at the same time are readily accessible by reason of the easily removable covers.

Priority attention has been given to the possibility of wear to the big ends, main bearings, pistons and cylinder liners. A standard type of wet liner, chrome-hardened with the patented Listard process, has been adopted. This specially developed process for chrome-hardening cylinder liners gives a very high wear-resisting surface. The crankshaft, connecting rods and bearings are of exceptional size and strength to counteract the effects of higher speeds. The journals have hardened surfaces and the bearings of white-metal steel backed with precision finish, require no special fitting. The big end bearings are of the same type but are copper lead lined. The crankcase is very rigid and the cooling system is of the directional type. Cooling is by radiator or tank. A high output cooling centrifugal water circulating pump is fitted as standard. The camshaft, like the crankshaft, has been given most generous dimensions and is particularly well supported: besides the locating bearing it has one

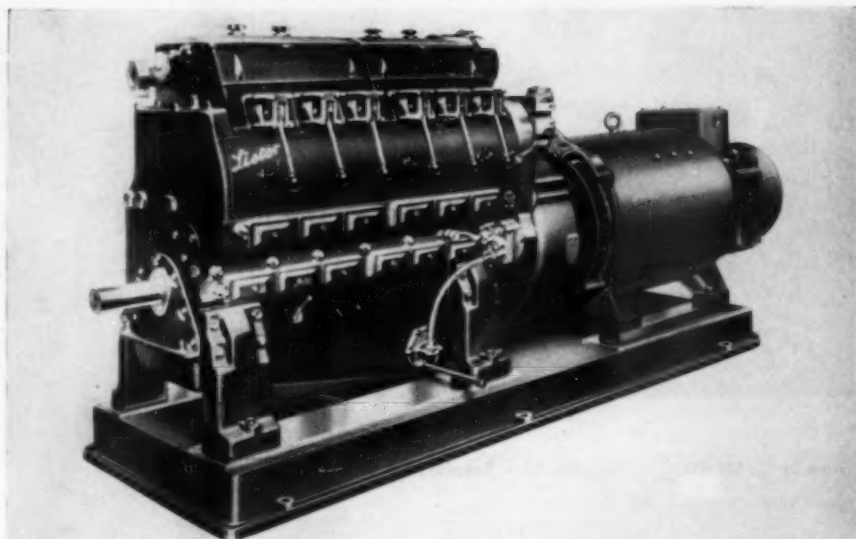
bearing to each cylinder and for the purpose of standardization in both design and service, individual fuel pumps have been fitted.

Helical gears cut to extremely fine limits ensure a minimum of backlash and consequent silent running. All auxiliary components are driven from the same train of gears grouped at one end of the engine. The centrifugal governor provides close speed control maintaining the "settled" variation within 2% while the fully automatic release limits overloading to 10%. Accessibility is an important feature. Inspection and replacement of working parts can be carried out with a minimum of dismantling. A detachable sump gives easy access to all crankshaft bearings and the oil strainer is removable as a unit providing a large handhole for cleaning the sump. A gear type oil pump is mounted externally and above the oil level to make it readily accessible no matter what type of engine mounting is employed. Special provision is made to ensure the instantaneous priming of the pump.

The built-in fuel filter is of original design. A large capacity element is wound in spiral form in a spe-

cial container and the complete unit is housed in the settling chamber which forms part of the crankcase. Simplicity of removal and cleaning of the filter elements are attractive features of this component. A large capacity air cleaner of the oil bath type imparts a swirling motion to the air drawn in and, by centrifugal action and suitable baffles, deposits any foreign matter present in an oil-filled trough. A Lister Patent Air Silencer considerably reduces air intake noise. The Lister dual combustion chamber operated by a spring loaded lever gives a high compression ratio for easy starting and the lowest practical ratio for normal operation. During the past twelve months, sales and service personnel from Lister's widespread overseas organization have visited Dursley to undergo a special instructors' course on the "Freedom" engine. This will permit the establishment of instruction schools in Canada, South Africa, East Africa, Malaya, Ceylon, Australia, Argentina, Brazil, Colombia, Venezuela, French Morocco, the U.S.A., Holland, Belgium, France, Norway, Portugal, Syria, Irak, Siam and elsewhere. Stocks of spares are already available in all markets although the Freedom engines themselves are not yet in full production.

Lister diesel electric generating plant with F.R. 6 engine.



KATO A.C. GENERATORS

from 350 watts to 350 K.W.
for CONTINUOUS
or
STANDBY POWER

Kato generators with speeds of 1200 RPM or less are provided with V-belted overhead excitors. 1800 RPM generators also can be supplied with overhead excitors on specification.



SWITCHBOARDLESS GENERATOR

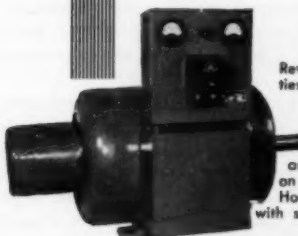
Small, Compact Panel mounted in rubber. Automatic Voltage Regulator, separate exciter driven with multiple V-belts.

Illustrated at left is the 300 KW KATO Generator with top mounted exciter and instrument panel with outlet cabinet. 8 pole rotor-60 cycle showing fan, collector rings and cartridge type bearings.

KATO GENERATORS, both revolving armature and revolving field types are precision engineered, conservatively rated and durably built of finest quality materials.

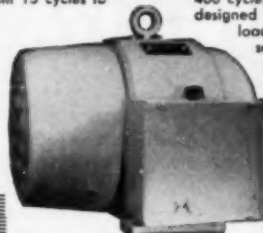
KATO ENGINEERING has been building special electrical machinery since 1928. Our modern, well equipped plant produces the finest in generators and electrical machinery from the smallest to the largest. We invite your inquiries regarding your special requirements.

AVAILABLE IN EITHER TWO BEARING OR SINGLE BEARING TYPES FOR ADAPTING TO STANDARD S.A.E. BELL HOUSINGS OR TO SPECIFICATIONS



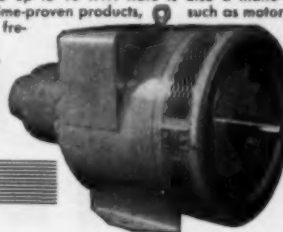
Revolving armature recommended for capacities up to 5 KW. The AC winding and a low voltage DC winding with capacity sufficient to energize field coils is carried in the same armature. Permits electric cranking from storage batteries. Revolving armature machines with DC and AC winding on one armature specified as self-excited type. However, 2 KW and larger sizes are available with separate exciter upon specification.

Revolving Field A.C. Generators from 5 KW to 300 KW, in 4, 6, 8 and 10 pole designs (1800, 1200, 900, 720 RPM at 60 cycles). Many capacities available in frequencies ranging from 15 cycles to 400 cycles. Conservatively rated, designed to carry a 25% overload. Generators are of the semi-enclosed drip-proof design with suitable end shields to facilitate inspection of collector rings, brushes, commutators.



All Kato generators are available for several types of application. Adaptable to standard SAE Bell Housing mountings. Revolving Field types of 5 KW and larger designed with windings suitable for automatic voltage regulator. Damper Windings for parallel operation of two or more generators. Drip-proof, semi-enclosed design. End shields facilitate inspection of collector rings, brushes, commutators, bearings.

All generators and exciters sufficiently filtered for operating radio receivers, on standard broadcast bands. Special filtering can be furnished on specification. Kato generators are currently meeting rigidly inspected military specifications. DC generators of standard voltages are available up to 15 KW. Kato is also a manufacturer of many time-proven products, such as motor generator sets, frequency changers, ringing power machines, AC and DC motors, rotary converters, etc.



KATO Engineering Company

Write for Details and Prices
1443-C FIRST AVENUE, MANKATO, MINNESOTA

Caterpillar Factory Installed Torque Converters

Caterpillar Tractor Co. has announced that factory-installed torque converters can be provided for six sizes of its industrial engines. Diesels with converters are being used to power excavators, cranes, railroad switchers, oil drilling rigs, logging yarders and other equipment. On heavy and varying loads, these torque converters allow the engines to maintain a continuously high output. Turning effort is multiplied considerably at low output speeds. When loads are lifted or lowered, as in crane operation, the converter facilitates the "pick up" of a standing load or the braking of a load being

lowered. Cat diesel engines available with torque converters range from 70 to 500 brake horsepower and include the D397, D386, D375, D337, D318, and D315.

With the smaller, in-line engines—D337, D318 and D315—power can be delivered to the converters with or without a clutch, or with a clutch and reversing gear. Output arrangements include either a stub shaft or chain housing, the latter available in two sizes. Converters for the three larger, V-type engines—D397, D386 and D375—may also be installed with or without a clutch. They may either be direct-coupled to the engine or chain driven. A stub shaft is provided on the output end of the

converter. The torque converter mentioned above are Twin Disc models that use ordinary diesel fuel as hydraulic fluid, making it possible to attach a charging device that draws from the engine fuel supply. An independent cooling system is also offered. Additional information may be secured from the Caterpillar dealers or from Caterpillar Tractor Co., Peoria 8, Ill.

Observe Dynamometer Tests



L. A. Kiethley, Assistant General Foreman Bus Maintenance, Capital Transit Company, Washington D.C. (left), and G. R. Burroughs, Assistant Supervisor of Garages for Capital Transit, (right) watch the operation of a 200 hp. Model NHHB-600 (horizontal) Cummins Diesel on the test line at Cummins Engine Company, Inc., Columbus, Indiana. Kneeling is A. A. French, serviceman from Cummins Diesel Engines, Inc., Baltimore. The three men recently visited the Cummins factory to learn the latest maintenance techniques on Cummins Diesels. Capital Transit is now taking delivery on 92 Cummins powered White buses.

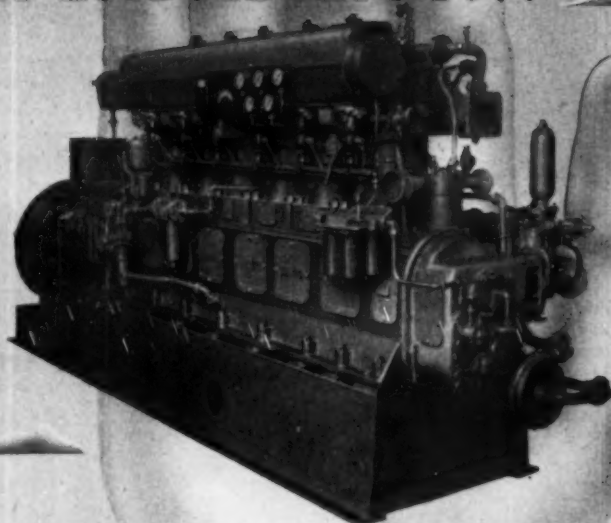
Worthington Names Branch Managers

Worthington Corporation has appointed Paul J. Foley manager of its Kansas City office and William M. Fine manager of its Milwaukee branch office. This announcement was made by T. J. Kehane, assistant vice president and general sales manager.

Mr. Foley joined the Worthington organization in 1937 after completing the Worthington Student Training Course. He then became a sales engineer in the company's Chicago office and later was made manager of its Milwaukee branch office. A graduate of Northeastern University, he is a member of the American Society of Mechanical Engineers, the Milwaukee Athletic Club, Wisconsin Club, Madison Club and the Milwaukee Sales Managers' Association. Mr. Foley succeeds W. R. Kennedy, who has been named a consultant to his successor.

William M. Fine was graduated from Lehigh University in 1939 with a B.S. degree in industrial engineering where he was elected to Pi Tau Sigma, an honorary mechanical engineering fraternity. He then took the Worthington Student Training Course and became an estimating engineer in the company's Chicago office. In 1943 he joined the sales force in that office. He is secretary of the Chicago Alumni Association of Kappa Sigma and is a member of the U. S. Junior Chamber of Commerce.

Since 1885 UNSURPASSED DEPENDABILITY...



Today's modern UNION Diesel products* incorporate and pioneer improvements which assure unsurpassed dependability for your —

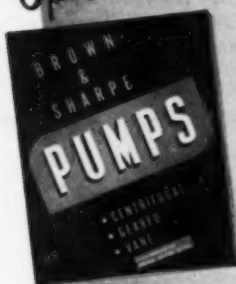
**Greater Safety • Lower Operating Costs
Long Term Satisfaction • Increased Profits**

*DIESEL ENGINES
DUAL-FUEL ENGINES
GENERATOR SETS
HEAT EXCHANGERS
ALARM SYSTEMS
CUSTOM MACHINERY

UNION DIESEL

2121 DIESEL STREET • OAKLAND 6, CALIFORNIA, U.S.A.

*For Trouble-free Diesel
Operation...*

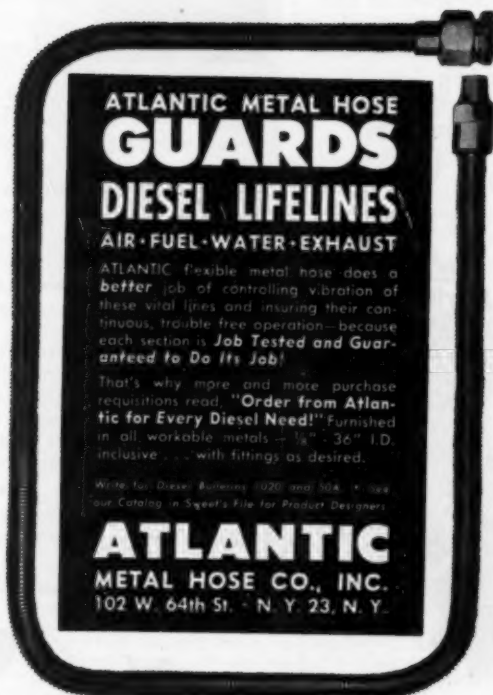


**WIDE
SELECTION
PERMITS THE
RIGHT CHOICE**

We urge buying through the Distributor

BROWN & SHARPE BS

Send for a copy of this Catalog and see how many quality-built Brown & Sharpe Pumps are available for diesel use. A wide range of types and sizes in standard rotary geared pumps with various styles of special mountings greatly simplifies the right selection for the job. Have a catalog handy for quick reference. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



**ATLANTIC METAL HOSE
GUARDS
DIESEL LIFELINES**
AIR • FUEL • WATER • EXHAUST

ATLANTIC flexible metal hose does a **better** job of controlling vibration of these vital lines and insuring their continuous, trouble-free operation—because each section is **Job Tested and Guaranteed to Do Its Job!**

That's why more and more purchase requisitions read, "**Order from Atlantic for Every Diesel Need!**" Furnished in all workable metals— $\frac{1}{8}$ "— $\frac{3}{8}$ " I.D. inclusive—with fittings as desired.

Write for Diesel Bulletin 1020 and 104, or our Catalog in Speed's File for Product Designers.

ATLANTIC
METAL HOSE CO., INC.
102 W. 64th St. • N. Y. 23, N. Y.



This unit of four Fram Filters serves two 500 hp air injection Fulton Diesels in large eastern quarry. Another unit of three Fram Filters protects 1000 hp solid injection Fulton Diesel from harmful quarry grit and dust.

FRAM FILTERS Protect Vital Diesel Engines from Quarry Contaminants

Two Fram Filter installations protect a large Eastern quarry's vital diesels from damage by engine-killing sand, lime and cement. These diesels drive generators that supply the entire plant with power . . . must operate 24 hours a day, 6 days a week to maintain production.

The quarry's chief engineer is plenty enthusiastic about time- and money-saving Fram Filters —says all his diesels must be Fram-equipped for maximum service.

Let FRAM Solve YOUR Diesel Filtering Problems

Fram Filters can:

- protect your diesels • reduce costly down-time
- prolong engine life • lower operating costs

Write today to: FRAM CORPORATION, Providence 16, R.I.

In Canada: J. C. Adams Co., Ltd., Toronto, Ontario



Automatic Dynamic Braking Control

American Locomotive and General Electric Companies have announced new automatic braking control and notchless tractive effort control for Alco-GE locomotives. Alco-GE road switching, freight and passenger locomotives now are equipped with automatic control of dynamic brake, which maintains maximum braking over the normal speed range. In addition, automatic control provides greater braking capacity on road freight and passenger locomotives, ranging from 2100 hp. at high speeds to 2660 hp. at approximately 24 miles per hour. With manual control formerly used, 2100 hp. was the maximum allowable throughout the same speed range. With automatic

control, braking capacity of 1900 hp. is maintained on Alco-GE four-motor road switchers and capacity of 2900 hp. is available on six-motor road switchers.

The system, which allows fullest use of dynamic braking, eliminates the necessity for the engineman to adjust the braking lever manually at different speeds to avoid exceeding a pre-set limit as shown by the load ammeter or the braking warning light. The automatic feature of the system allows the braking lever to be set in maximum position at all times. From a previous limit of 800 amperes at all speeds, the new system provides a limit of from 800 amperes at high speeds up to 900 amperes maximum on road freight and passenger units. Notchless tractive effort control, available on Alco-

GE 1600 hp. road freight and road switching locomotives as a modification, affords fine variations of speed and tractive effort necessary in hump service and in starting heavy trains under difficult track conditions. Often called a hump controller, this device provides a varying limit for tractive effort in any particular throttle notch, by utilizing current limit feature of the Alco-GE locomotive control system. As an example, the engineman may set the throttle in eighth notch position and by means of the hump controller rheostat handle lower the maximum tractive effort to that normally obtained on fourth notch operation. Since the control is provided by a rheostat, the change is smooth and stepless.

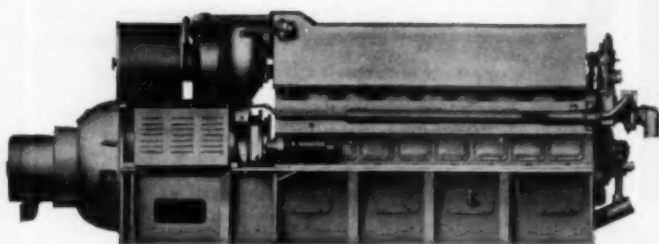
In heavy duty, the engineman may set his throttle at the maximum power he will need, then hold the desired speed accurately despite the varying loads caused when cars are cut off at the hump. In starting a heavy train under difficult track conditions, the engineman can use notchless tractive effort control to increase tractive effort to the exact point required to move the train without wheel slippage.

STERLING offers you all three!

- ✓ **LOW INITIAL COST**
- ✓ **LOW OPERATING COST**
- ✓ **LONG LIFE**

For fifty years the Sterling Engine Company has been producing high quality light and heavy duty equipment for an ever widening variety of industrial applications.

No matter how diverse the applications, however, Sterling engines have always been characterized by the "Big Three" value that has spelled efficiency and economy to engineers and industrial users for generations.



STERLING ENGINE COMPANY

1270 Niagara St. • Telephone LI 0382 • Buffalo 13, N. Y.

Industrial Sales Manager

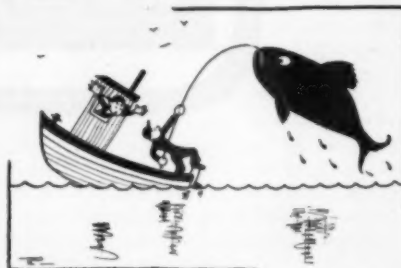


A. E. Dorn

A. E. Dorn has been named industrial sales manager, Tractor Division, Allis-Chalmers Manufacturing Company, according to an announcement by W. G. Scholl, vice president and general sales manager. He succeeds R. M. Stone who has resigned to become associated with the Allis-Chalmers industrial dealer-

ship in St. Louis. Mr. Dorn has been Pacific Coast territory manager for the firm since 1943, supervising sales including industrial products in the Western states, British Columbia, and Alaska. He started with the company in 1934 and most of his service has been in industrial sales. He was an industrial salesman at the Omaha, Nebraska branch, assistant supervisor of grader sales, and Southwest industrial territory manager.

L. W. Davis, branch manager at Oakland, California, succeeds Mr. Dorn as Pacific Coast territory manager. After several years in the retail and wholesale equipment business in Kansas, Colorado, and California, he joined Allis-Chalmers as a blockman at Oakland, in October, 1939. He has been assistant branch manager at Los Angeles, branch manager at Pocatello, Idaho, and on January 1, 1951, was transferred to the managership at Oakland.



DIESEL PROGRESS

CITIES SERVICE OILS WORK ON

"The Longest, Toughest Truck Haul in the World!"



FROM DULUTH, MINN. TO FAIRBANKS,
ALASKA ... 7000 MILES ROUND TRIP
PER MONTH ... IN TEMPERATURES RANG-
ING FROM 100 ABOVE TO 70 BELOW ...



Albert Herda

...trucker extraordinary, uses
Cities Service "C" Series Oil
in year round operation.

CITIES



SERVICE

Quality

Petroleum Products



SAYS ALBERT HERDA ... "Hauling everything from beer to eggs... across every kind of country... through every kind of weather... I've used Cities Service "C" Series oils and have had the best of luck. I heartily recommend Cities Service Oils for unusually rugged service as well as the ordinary job."



HIS OWN SERVICEMAN ON LONG, LONELY HAULS ... Besides driving, Herda handles all the jobs of truck maintenance on the road... everything from changing tires to checking the oil. During the summer when temperatures soar up over a hundred, "C" 300 Series SAE 30 gives him the long motor oil mileage and complete engine protection he must have.



BLOWTORCH HEATS CAB IN ALASKA COLD ... Big bus heater not enough to heat cab in extreme cold. Blowtorch aimed at feet does job. Under such tough operating conditions, Herda depends on "C" 300 Series SAE 10 to give complete lubrication and engine protection. High quality Cities Service Products can serve best in your operation too.

The OP Repack Filter

The efforts of a lubricating engineer to solve the problem for his customers were responsible for the development of a new product which promises savings in maintenance cost for the entire diesel industry. The product, announced to the trade for the first time in the columns of DIESEL PROGRESS in May, is the OP Repack Filter, manufactured by the Duluth Filter Company, Duluth, Minnesota.

Principal advantages of the new filter are the efficient removal of solids, the low cost of repacking and the fact that channeling is not possible. Excess bolts and nuts have been eliminated. A wing nut provides easy access to internal parts. Only the contaminated material is thrown away. The only gasket, recessed in the head is made of Hycar material to withstand pressure and temperature conditions. Cartridge is sealed by machined surfaces. Split cage is easily unbuckled for quick removal of contaminated material, without fishing from the top.

Development of the filter came as a direct result of lubricating problems encountered by diesel operators, particularly those interested in economy. With the first heavy duty trucks to operate in the open pits of the Minnesota Iron Range, oil filtration became a major problem as the big trucks took over the job of hauling ore out of the pits. As they operated on a 24-hour a day basis it was necessary to change filters every 100 to 150 hours or at least twice a week for each truck. As an example a company with 100 units in operation could



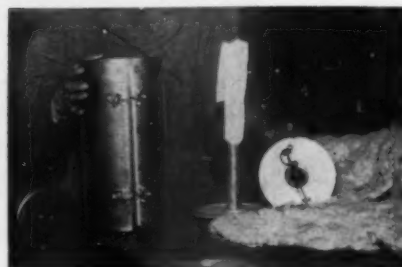
The Sathers check over the unique portable unit complete with pump, motor and heater.

expect to spend as much as \$400 a week on filter cartridge replacements alone. The problem was presented to O. P. Sather, lubricating engineer, who for 30 years had been meeting such difficulties and solving them on the job:

In search of an effective and cheaper way to filter oil he made up a model cartridge and submitted it for laboratory and field tests. It immediately produced an order for 30 units and a new industry

was born. The company with 10 units in operation now could reduce the \$400 weekly cost for filter cartridge replacements to \$150 with the new filter.

Mr. Sather called for help from his son Leonard, a former instructor in Diesel Engineering for the Maritime Service at the U. S. Merchant Marine Academy, and at the USMS Diesel School conducted at the Nordberg plant in Milwaukee. The younger Sather took over the job of producing and selling the new product. The OP Repack Filter met with immediate acceptance. It was found that the same problems existed in the stationary field as in the automotive and models were developed to meet every need. "Every OP Repack Filter we have installed is still in service," Leonard says. "We have found the means of providing effective filtration at low maintenance cost. We hope to make our filter available to every diesel operator interested in saving money and improving his filtration."



Few parts make up the OP Repack cartridge; split cage, showing buckles; center tube with cotton sleeve; cartridge cover, showing oil seal; and OP Repack material, a superior redwood cellulose.

another **important***
diesel installation

gets **HONAN-CRANE** Oil Purification

In the three diesel installations at The International Latex Corporation, Dover, Delaware, every detail has been planned for maximum efficiency and economy of operation. That's Why Honan-Crane Lube Oil Purifiers again are first choice for dependable protection against breakdown and excessive wear caused by contaminated oil.

Honan-Crane Oil Purification (for either inhibited or straight mineral oils) protects bearings, cylinder walls and other finely machined parts from improper lubrication and costly damage often caused by solid abrasive contaminants . . . or by acids, gums, resins and other products of oxidation.

Write today for complete information about Honan-Crane Diesel Fuel and Lube Oil Purifiers.

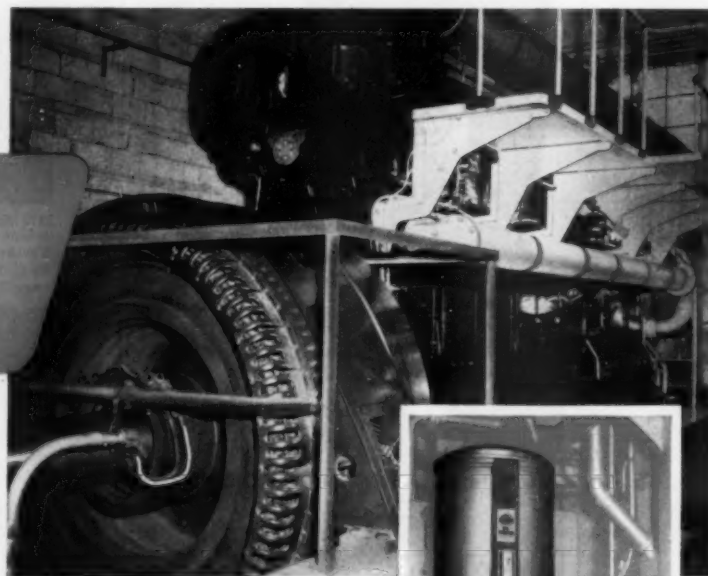
ALL HONAN-CRANE EQUIPMENT IS SOLD ON A PERFORMANCE GUARANTEED BASIS

WORLD LEADING

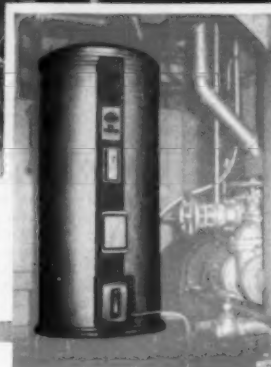
OIL FILTER MANUFACTURER

HONAN-CRANE CORP., 202 Indianapolis Ave., Lebanon, Indiana

A Subsidiary of HOUDAILLE-HERSHEY CORPORATION



* 40% recovery of traditionally wasted engine heat is the amazing accomplishment of newest diesel installation at International Latex Corp. Shown above is the 1700 hp. Cooper-Bessmer protected by Honan-Crane continuous lube oil purifier at right. Two other Cooper-Bessmers are also served by Honan-Crane purifiers.



© 1953 HONAN-CRANE CORP.

Yacht "Ginny"



One of the most beautiful yachts to come out of a shipyard in the Miami area was the *Ginny* which was launched this spring. Owner of this custom built 65 ft. craft is Mr. Presley Anheuser of the famed Anheuser Busch family. This sea going yacht was designed and built by Charles Boucher of the Boucher Yacht Works on the Miami River, the welded steel hull was constructed at the Miami Ship Co. and the superstructure and interior at the Boucher Yacht Works. The two 150 hp. model HM600 Cummins diesels with 2:1 Twin Disc reduction gears and a front power take off were installed by Cummins Diesel Engine Co. of Florida, which along with the two 30x26 Columbian propellers move the *Ginny* at 12 knots. In the engine room is a 3-in. Jager all brass bilge pump and Willard marine batteries.

Within the protection of her rock wool insulated hull are all the appurtenances necessary for a comfortable cruise. All the beautiful wood work is of natural finish mahogany and done by a master craftsman. The master stateroom is aft along with the two guest staterooms. All three baths have Standard plumbing fixtures with Groco electric toilets. The galley is all stainless steel with a large Frigidaire refrigerator and Amana deep freeze; the dinette is finished in red plastic and concealed in one corner is a 90 gal. Rudd gas water heater for the ship's heating system. The usual navigational aids are in the spacious pilot house and lounge, such as automatic pilot and an 85 watt Pearce-Simpson radio. "A big little boat" are the words of description from Charles Boucher the designer, "and a beautiful craft, inside and out."

New British Diesel Train

A new British-built diesel train designed to achieve economies in branch-lines and on some main-lines began its experimental service out of London late in May. This is part of the British Railways study of the possibilities of using light weight units for passenger traffic. The diesel train is similar to a bus in many ways. The driver sits at the front in full view of the passengers, operating only the main power and brake controls. The mass-produced power unit is the same as those used in the latest suburban buses. It gives a maximum speed of 48 mph. and a cruising speed of 45 mph.

The three car train has two motor cars and an engineless trailer between, with a total capacity of 129 passengers and an unladen weight of nearly 40 tons. It can be driven from either end and in slack periods the trailer can be shed, thus reducing weight. The maintenance costs are low. Fuel consumption is 5½ miles per gallon.

Valve Research Center

A Research Center has been established in Philadelphia by the Valve Division of Minneapolis-Honeywell Regulator Company to support an extensive development program in industrial valves, it was announced by S. A. Keller, general manager.

The test and research equipment, housed in a two-story brick building, will evaluate present valve design and performance as well as implement research into new valve types to parallel advances being made in modern process control, Keller said.

An elaborate hydraulic laboratory is built into the Research Center to measure valve capacities and the static and dynamic internal forces of valves. More than 2,000 gallons of water a minute can be pumped through the test stand under pressure up to 100 pounds per square inch. High temperature testing equipment will measure the strength of valve components at temperatures up to 700°F. An important phase of the research activity, Keller said, will be the determination of the suitability of substitute valve materials proposed to relieve the critical alloy situation. A modern model shop supports the diversified research program.

Closes Plant for Two Weeks

The Lanova Corporation of Long Island City, New York, will close their entire plant from August 4th to August 15th for vacation. During this interval all activities except for a skeleton office crew will be suspended. The skeleton office force will remain on hand to handle emergencies. The company requests that shipments or important communications be scheduled to avoid this period.

THOMAS

Flexible ALL METAL
COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:

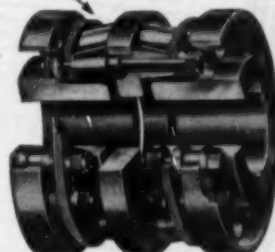
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years

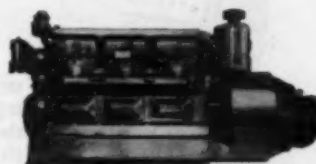


PATENTED FLEXIBLE DISCS

**BACKLASH
FRICTION
WEAR AND
CROSS-PULL
are eliminated
Lubrication is
not required!**



THE THOMAS PRINCIPLE GUARANTEES
PERFECT BALANCE UNDER ALL
CONDITIONS OF MISALIGNMENT.
NO MAINTENANCE PROBLEMS.
ALL PARTS ARE
SOLIDLY BOLTED TOGETHER.



**FOR SUCH TOUGH JOBS AS: DIESEL
COMPRESSOR DRIVES, MARINE MAIN
DRIVES, LOCOMOTIVE MAIN DRIVES,
AUXILIARY DRIVES, ETC.**

Write for the latest reprint
of our Engineering Catalog.

**THOMAS FLEXIBLE
COUPLING CO.**
WARREN, PENNSYLVANIA

EMD Appointments



Milton H. Gardner

G. C. Mikelson

Appointment of Milton H. Gardner, former general repair sales manager, as assistant general sales manager of Electro-Motive Division, General

Motors, is announced by Paul R. Turner, director of sales. Mr. Gardner's promotion follows consolidation of the commercial selling activities within the sales department. Mr. Turner said, with rebuilding of locomotive components being joined with new locomotive sales activities. Mr. Gardner has been with Electro-Motive since February, 1938, when he joined the organization as a service engineer. After holding various positions in Electro-Motive's Service Department, Mr. Gardner became St. Louis regional service manager July 1, 1946. In April, 1948, he was promoted to district sales manager, St. Louis Region, and a year later was made general repair manager at La Grange. With expansion of Electro-Motive's rebuilding facilities,

Mr. Gardner was made general repair sales manager in early 1951, the position he held until his recent promotion.

Promotion of G. C. Mikelson to sales representative in the Chicago region is announced by Paul R. Turner, director of sales of Electro-Motive Division, General Motors. Mr. Mikelson, formerly a sales engineer in Electro-Motive's sales department, joined Electro-Motive January 4, 1939. He became a personnel instructor in the service department in May, 1943, and a senior instructor in the service department three years later. On April 1, 1949, Mr. Mikelson became a service engineer, and in the following year, Oct. 1, 1950, he was promoted to district engineer. He was made a sales engineer Feb. 16, 1951, the position he held prior to his recent promotion.

WHO ELSE GIVES YOU THIS MUCH PROTECTION?



Winslow guarantees both the quality of its filters and elements and the safety of your equipment when these products are used on it. When you buy Winslow, you buy peace of mind. Enjoy this added value!

WINSLOW FILTERS

Winslow Engineering Company 4069 Hollis Street • Oakland 8, California

Both Are Necessary



Some persons are destined for a life of glamour while others are destined for a life of work. That is also true of these two diesel locomotives turned out recently at the Beloit Works of Fairbanks, Morse & Co. The larger of the two, the sleek black, gray and silver giant, one of twin units, was built to haul the New York Central's famed streamliner, The James Whitcomb Riley, between Chicago and Cincinnati. The smaller locomotive was delivered to the Milwaukee road for the drudgery found in switching cars around in one of the system's freight yards. Eight of the big C line passenger units, powered by 2400 horsepower opposed piston engines, were delivered to the New York Central in March, while during the first quarter the Beloit plant turned out twelve C line freight locomotives for the New York Central. The switcher is powered by a 1200 horsepower opposed piston engine.

Marine Cleaning Manual

"Answers to 57 Shipyard Cleaning Problems," is the title of an illustrated 32-page booklet, publication of which has been announced by Oakite Products, Inc., manufacturers of industrial cleaning and allied materials. Under the three main section headings "Shipbuilding," "Steam and Diesel Power Unit Maintenance," and "Cleaning Procedures for Ship Maintenance," the booklet discusses recent developments in materials and procedures designed to save time and costs on construction, repair and maintenance tasks in shipyards. Helpful data on performing cleaning, descaling, derusting, metal-preparation, paint stripping and other operations is provided by the booklet, with specific material, method and equipment recommendations for handling the work presented in detail. Anyone desiring free copies of this informative booklet may obtain them by writing on company letterhead to Oakite Products, Inc., 122D Rector St., New York 6, N. Y.

DIESEL PROGRESS

Diesel Training in South America

GENERAL Motors Series 71 Diesel engines first entered into oil well drilling operations at the end of World War II in West Texas. A Twin-Six unit was the first to be used and within a few months the use of these engines in drilling operations had spread to other parts of the United States. In 1946 the use of GM Series 71 units spread to South America when the Oil Well Supply Company first shipped nine GM Diesel-powered rigs to Venezuela for the Creole Petroleum Corporation. Venezuela operators were, of course, entirely unfamiliar with these engines and their entrance into the country brought about the immediate necessity of adequate training of personnel in proper operating and maintenance procedures.

This training in Venezuela naturally was the responsibility of General Motors Overseas Operations which immediately cast about for a man who could organize and conduct such a training program. Obviously such a man would need a number of very specialized qualifications. First he had to have an intimate working knowledge of the product, had to be familiar with training procedures and above all had to speak the Spanish language. Such a man was found in the person of Alex Areffi who was a service employee of General Motors' Detroit Diesel Engine Division. Areffi had an intimate knowledge of the product. Indeed, he had worked on GM Diesel engines in West Texas after the war. In fact



Alexander Areffi, General Motors training course instructor, explaining the Series 71 fuel system to a group of Chilean diesel operators.

part of his job was actually training mechanics—and he talked Spanish.

Detroit Diesel released Areffi to General Motors Overseas Corporation for this important project and he was assigned to a long range program to train operators, maintenance men and mechanics at the Creole Petroleum Camp in La Salina (near Maracaibo) Venezuela. It was soon evident that General Motors Overseas Operations had selected the right man. The program Areffi set up and carried out was wholeheartedly welcomed and supported by the management of the Creole Petroleum

Corporation and later by such companies as Mene Grande, Shell and others. A large, well-equipped building was assigned for the diesel school, with ample space for classrooms, laboratory, and air conditioned injector room. The school was officially opened on March 1, 1947, and continued without interruption until November of the same year. At first, men were assigned to operate the rigs; afterward, mechanics and maintenance men were sent to the same school for more detailed training.

The students were given the general theory of diesel engines and of series 71 diesels in particular. Lectures were supplemented by moving pictures on construction and operation of series 71 diesel engines, lubricating and handling of tools. Creole Petroleum Corp. did not stop at training only their operators and mechanics. At a later date, they sent their foremen and supervisors to the school. Besides Creole Petroleum personnel, employees from other companies, such as Mene Grande, Shell, and others, were admitted to the diesel school through the help of the Industrial Relations Office.

By the time a sufficient number of men were trained to operate and maintain series 71 engines for the drilling rigs, Creole Petroleum Corp. began to receive boats equipped with series 71 marine diesels for service on Lake Maracaibo. This new development called for training personnel for marine

SLUDGE STRANGLING YOUR ENGINE?

PROTECT YOUR ENGINE AGAINST SLUDGE with **THE wixkuler**

FRESH WATER ENGINE COOLING!

Easily installed inside the craft for longer engine life.

REG. U.S. PAT. OFF.

WIX Cooler Co.

2900 Westlake North • Seattle 9, Wash.

Continuous Duty - DC SOLENOIDS
6V-12V-24V and 32 Volts

For operating throttles, chokes, fuel pump racks, and other applications not requiring more than 10 lbs. pull over $\frac{1}{2}$ " stroke.

The solenoids are ruggedly constructed and are entirely enclosed. Are furnished with a threaded plunger for connecting to linkage. Special plungers can be supplied if required.

Weight $2\frac{1}{2}$ lbs. Overall length $4\frac{1}{2}$ ", width $3\frac{3}{4}$ ". Uses 220 watts while pulling, and $6\frac{1}{2}$ watts while holding.

For further information, ask for Bulletin No. 410, or our catalog covering our complete line of Automatic Controls for gas, gasoline, and diesel engines. When ordering give voltage.

Since 1932

SYNCHRO-START PRODUCTS, INC.
8751 N. RIDGEWAY AVE. • SKOKIE, ILLINOIS

engine operation. Creole Petroleum Corp. built a new school next to the general marine repair shop at Lot 66 (La Salina Camp). The location of the school adjacent to the general repair shop helped considerably to train more highly efficient mechanics. Students worked on "live engines" and overhauled engines removed from boats. The training course was extended from the usual three weeks to six weeks, and in order to give better opportunity to participate in actual work, only two men were assigned to each engine. During the six-week course, time was given for theory of diesel engines, construction of series 71 marine units, and at least two engines were overhauled and tested on a dynamometer, by each group during the course.

Diesel training activities in Venezuela were not limited to training oil field personnel. The Venezuelan Government employees and the Venezuelan Navy were also interested in training their men to operate and maintain diesels. In Katia del Mar, a training center for enlisted men was established by the Venezuelan Navy. The Ministry of Public Works of Venezuela was also interested in having their personnel trained as they had a large number of diesel generator sets.

Training activities on General Motors diesel engines later spread throughout almost all countries of Central and South America and the Caribbean Islands. In Bogota, Colombia, several training

courses were held for oil field personnel, and for private owners of industrial and electrical units. It should be mentioned here that the desire of the general public to acquire knowledge of diesel engines is actually immeasurable. For instance, at the end of the first training course in Bogota (in October, 1951) the General Motors distributor in Colombia, Motores Ltda., placed an article in local newspapers. On Thursday of one week, at the request of the local distributor, newspaper reporters and photographers arrived at the school; and on Friday in several newspapers there appeared an article with illustrations describing the General Motors diesel training course. On the afternoon of the same day and all Saturday morning, a steady stream of men came to inquire regarding the possibility of enrolling in the next course. The next course, instead of having only six men scheduled had more than 30 men, and many more were turned down with the promise to reopen the courses in the near future. Among those who were on the list for the future diesel training program were several Colombian Navy personnel.



Classes in the South American diesel courses are divided in small groups for actual work on the engines. Here a group is seen study a Series 3-71 General Motors diesel.

Chile was also eager for knowledge of diesel engines. Several training programs were established through the entire territory of Chile in various applications of series 71 engines. First, sales and service personnel of the General Motors distributor and Allis Chalmers were given courses on series 71 engines. This training was followed by a diesel course presented to Empresa Nacional de Transportes, Escuela de Artes y Oficios, Empresa "Mercurio." The Chilean Navy became interested, and a special course was set up in the Navy Mechanical and Electrical School at Valparaiso. Over 100 men, including Commanders, Junior Officers, Chiefs, and enlisted men, attended these courses. A request for training was also received from Chuquicamata Copper Mine in the northern part of Chile. General Motors Diesel engines were used in Chuquicamata by Chile Exploration Company and Foley Bros., construction firm, who have been engaged in building a new plant for a copper mining company. Chuquicamata Copper Mine is located nearly 10,000 feet above sea level, and it was of special interest to the operators to learn how to maintain engines in operation at high altitudes. Throughout Chile and other Latin American countries the interest and desire for knowledge of diesel engines is so great that these courses will be given periodically in the future.

C.A.V.

The World's largest manufacturers of Fuel Injection Equipment For Diesel Engines

DEPOTS AND SERVICE AGENTS IN OVER 100 COUNTRIES

C.A.V. Fuel Injection and Electrical Equipment

C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., 653, TENTH AVENUE, NEW YORK 19, N.Y.
Sales Office: 14820 DETROIT AVENUE, CLEVELAND 7, OHIO

174-481

Third Largest Turnpike



High compaction requirements on the Turner Turnpike call for 90 percent compaction of the 13-inch sub-grade and 95 percent compaction of the 16-inch template grade. Amis Construction is using two International TD-14A crawlers pulling compaction rollers on its portion of the turnpike near Bristow, Okla. An International TD-18A with Heil cable dozer works on the finished grade.

Third largest turnpike under construction in the country, Oklahoma's 88-mile Turner Turnpike connecting Oklahoma City and Tulsa, is now about halfway to completion. Starting from 120th Street and Northeast Boulevard in Oklahoma City, and terminating at the new 51st Street Arkansas River Bridge in Tulsa, the turnpike will slice 13¼ miles from the present highway distance between the two cities. Engineering calculations indicate time savings of 58 minutes for private cars and 50 minutes for commercial vehicles. These estimates are based on respective average speeds of 50 and 45 miles per hour. Named after the former governor, Roy J. Turner, who sponsored the creation of the Oklahoma Turnpike Authority in 1947, the divided, four-lane route will require twelve and a half million cubic yards of earthmoving, clearing 1,000 acres of land for right-of-way, and an estimated 2,450,000 square yards of pavement for its two 24-foot roadways.



Hard digging here on J. W. Moorman's job as an International TD-24 crawler pulling a 25 yard Bucyrus-Erie B-250 scraper gets an assisting push from another TD-24 which is also pulling a ripper.

Contracts have just been let to pave 28.4 miles of the turnpike north from Oklahoma City, and a recently let contract called for paving 27 miles south from Tulsa. Both contracts specify asphaltic concrete pavement. Work began on the project in January of 1951 and the highway is scheduled for completion in the fall of 1952. The entire route will have a minimum right-of-way width of 200 feet and will have long, easy curves with the sharpest curve a little more than two degrees. Complete separation from abutting farm land and commercial properties will be accomplished by a hog-tight wire and barbed wide fence strung on steel or concrete posts. All entrances and exits will be by means of traffic interchanges with separated grades eliminating all cross traffic and conflicting turns. Entry to and exit from the turnpike between

Oklahoma City and Tulsa will be made possible at Chandler, Stroud, Bristow, and Sapulpa, with additional provision for a future interchange at Warwick where the proposed state highway 40 will intersect the turnpike.

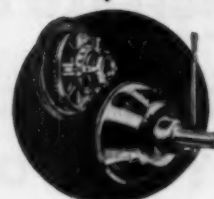
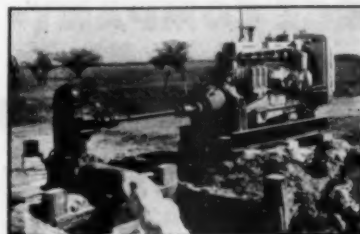
Harnischfeger Bulletin

P & H's complete line of electrical equipment designed exclusively for overhead crane service, is the informative subject matter of a new 32-page bulletin just released by Harnischfeger Corporation of Milwaukee, Wis. Every piece of electrical crane equipment, from Harnischfeger's patented AC Magnetorque crane control to current collectors, is expertly presented and explained by

photographs, charts, drawings and reading material. Background information on one of America's largest manufacturers of "thru the air" materials handling equipment, with its 68 years of experience in this and allied fields, also is included in this attractive three-color booklet. Free copies may be obtained by writing the Harnischfeger Corporation, Overhead Crane Division, Milwaukee 46, Wisconsin. Ask for Bulletin C5-1.

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

This Engine Produces



on Tough Pumping Jobs

For day-in-and-day-out pumping, the CATERPILLAR Diesel Engine does the job dependably and economically. Long, hard operations are its "meat". And ROCKFORD POWER TAKE-OFFS transmit its power to the pumping unit efficiently. Let ROCKFORD clutch engineers work with your product development department to design similarly reliable power transmission controls for your equipment.

ROCKFORD CLUTCH DIVISION 3000
1331 Highland Avenue, Rockford, Illinois, U.S.A.

ROCKFORD CLUTCHES

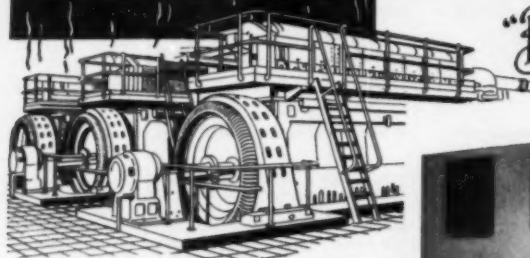


B-W
ENGINEERING
MAKES IT
WORK
B-W
PRODUCTION
MAKES IT
AVAILABLE



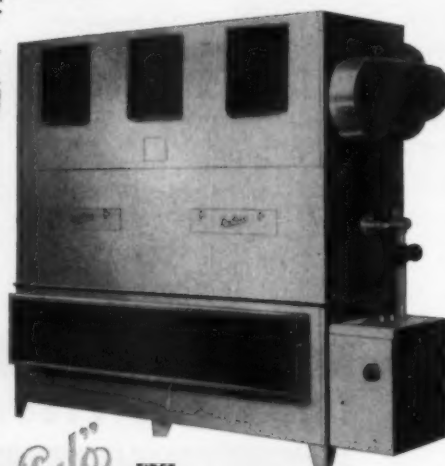
ENGINEERING
BULLETIN
SENT ON
REQUEST

**AVOID COSTLY
OVERHEATING**



**GET Dependable
DIESEL COOLING with**

**"Buffalo" EVAPORATIVE
COOLERS**



Keep jacket water temperature under control, and you get better efficiency from fuel and lubricants, to say nothing of lengthening engine life. "Buffalo" Evaporative Coolers do just this—do it in minimum installation space—use very little spray water. They have all quality parts: (1) "Buffalo" Fans, Pumps, and spray nozzles, (2) Acrofin spiral fin coils, and (3) sectionalized standardized construction which permits easy assembly, installation and maintenance. REQUEST ENGINEERING BULLETIN 3666 and look into these compact, dependable, money-saving coolers!

BUFFALO FORGE COMPANY

536 BROADWAY

FIRST
FOR FANS

BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

EVAPORATIVE COOLERS AND AXIAL FLOW FANS FOR COOLING MOBILE AND STATIONARY DIESELS

CUT YOUR DIESEL COSTS NOW!



**IN FIVE MINUTES the Merlin
"Servicemaster" will make
your Diesel injector nozzles and
needles like new.**

The Merlin "Servicemaster" will enable you to operate your Diesel engines at maximum efficiency all the time. It will cut your fuel costs and pay the operator's wage in one hour.

NEW MARINE ATTACHMENT. This attachment extends the range of the "Servicemaster" to embrace all accepted types of injector, including inverted types.

Needles up to 15½" long.

Needles up to 7/16" dia.

Special Vee blocks available for larger diameters. Needle or lap angles from 30°-150° inclusive.

NOW USED by leading Diesel Engine Manufacturers, Shipping, Railway and Transport Companies.

Full details from Burnett & Co. (Canada) Ltd., Agents for the U.S.A., Dept. D.P.2, Montreal Trust Buildings, King Street West, Toronto.

THE MERLIN ENGINEERING CO. LTD. - Hebble Mills, Salterhebble, Halifax, England

For Heavy-Duty Service



A new model Sterling-White chassis developed for oil field operations and other heavy-duty services has been announced by Mr. R. H. Clarke, general sales manager of the White Motor Company's Sterling Division at Milwaukee, Wisconsin. This Sterling-White, model SB 3255D, is engineered for the rugged service of handling drilling rigs and other heavy oil field machinery. Variations of this model are also available for logging and other heavy-duty off-the-road operations. A 200 horsepower diesel engine provides the power for this new model. Dual transmissions, a four speed main and three speed auxiliary, give the operator a wide selection of gear ratios, enabling the truck to provide good performance under all operating conditions. Top speed is 42 miles per hour in overdrive and, with both transmissions in low gear, total reduction is more than 120 to 1, resulting in a road speed as low as 2½ miles per hour at full engine-governed speed.

The dual rear axle unit is equipped with a suspension system which is engineered to carry heavy loads over rough, irregular roads and for frequent off-the-road operation in oil field service. Equalizer beams are mounted below the rear springs. This feature provides for equal distribution of the load, regardless of bumps, holes or other road irregularities and serves as a lever to help lift the load over the bumps. Because of the functioning of these equalizer beams and the torque rod system, most of the strains and shocks are absorbed before reaching the springs, making it unnecessary to use heavy, oversize springs. In addition, the low center of gravity afforded by this design, eliminates "chattering" and increases tire life. Standard tire sizes are 11.00-24 front and 12.00-24 dual rear mounted on ventilated steel disc type wheels. The steering is of the hydraulically power-actuated type. The side members are heat-treated alloy steel channel of ¾ inch material thickness, 11¼ inch deep, lined with a full length ¾ inch thick channel reinforcement and the full length wood insert.

ERROR

It is with sincere regret that an error crept into one of the captions for the Corpus Christi, Reynolds Metals story in our July issue, on page 55. The caption read, "behind are six of the Burgess Snubbers muffling the exhaust on all 83 engines." This caption should have read, "muffling the exhaust on all the Cooper-Bessemer engines." The Maxim Silencer Company provided the silencers for the 41 General Motors engines being installed, and to be installed, in Building No. 42. We extend our sincere apologies for this regrettable error.

DIESEL PROGRESS

**"Tycol Diesel Oils
give smooth performance...
assure top engine service"**



Absolutely correct! Tycol Diesel Oils are a must for satisfactory lubrication. Their degree of refinement — their service endurance — and their high stability mark them outstanding.

Tycol Diesel Oils have more than proved themselves after years of operation in Diesels of every description and in all types of service . . . from high-speed units for industrial, railway and marine uses where a heavy-duty or detergent oil is necessary to low-speed Diesels where a non-additive lubricant can be used. Yes, sir, there is a Tycol Diesel Oil scientifically engineered for every Diesel application — engineered to do the job better . . . at lower cost.

Your nearby Tide Water Associated office will be glad to give you complete information. Wire or phone today.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"



Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco



CYCLAN

**THE NEW PISTON RING MATERIAL FOR TOUGH SERVICE
IN HEAVY DUTY DIESEL AND GAS ENGINES**

1

Cyclan IS TOUGH,



WITH PLENTY OF TENSION, BUT NOT BRITTLE

2

Cyclan HAS TWICE THE BREAKAGE RESISTANCE



OF ORDINARY IRON

3

Cyclan RETAINS TENSION



UP TO 700° F.

4

Cyclan WITHSTANDS IMPACT, HAMMERING, FLEXING



5

Cyclan WITHSTANDS



CONSIDERABLE DISTORTION WITHOUT LOSING SHAPE

6

Cyclan RESISTS WEAR FAR BETTER



THAN STANDARD RING IRON

AVAILABLE FOR RINGS UP TO 9" DIAMETER.

Write for complete information



SEALED POWER
CORPORATION
MUSKEGON, MICHIGAN

Sealed Power

**PISTON RINGS · PISTONS
CYLINDER SLEEVES**

Dedicates New Diesel Engine Plant



On Saturday, June 7, Harnischfeger Corporation officially opened its new Diesel Engine Division in Crystal Lake, Illinois, bringing to nine the number of P&H plants now in operation. A large number of guests attended the cornerstone-laying ceremony which was begun with a welcome by Karl P. Schoepner, General Manager of the Diesel Engine Division. Keynote address was delivered by Walter Harnischfeger, president in which he reviewed the 68-year history of the company and the development of its products which, in addition to diesel engines, include power shovels, truck cranes, soil stabilizers, overhead cranes, electric hoists, welding equipment, and pre-fabricated homes. Henry Harnischfeger, executive vice president and Fred Salditt, vice president, also spoke briefly. A copper box containing records of the company and mementos of the day was deposited in the cornerstone, which was placed by Walter Harnischfeger.

Following the dedication, guests toured the new one-story building which occupies over 100,000 square feet and is located on an 80-acre tract of land. There were numerous exhibits with all component parts of P&H diesel engines displayed in their order of assembly. Guides and machine operators were on hand to explain the steps in the manufacture of the engines, from basic castings to completed engines and operating units. In this new building, which houses both the plant and general offices of the Division, P&H expects to triple production of its advanced line of 2-cycle diesel engines, built in 1, 2, 3, 4 and 6-cylinder models up to 138 horsepower for stationary, mobile and marine services. After the dedication and plant tour, luncheon was served. Beginning at 2 p.m., an Open House of the Diesel Engine Division was held for employees, friends and neighbors in nearby towns. Approximately 6,000 people attended during the afternoon.

De Laval Separator Appointment



Dick M. Landis

Dick M. Landis, assistant manager of the Industrial Division, has also been appointed manager of the Marine Division, which will now be moved to Poughkeepsie from New York City. Robert L. Smith, formerly Supervisor of the Marine Division at New York, has been appointed assistant to G. F. Wheelwright, Jr., manager of the Industrial Division of De Laval Separator Co.

Heat Transfer Presentation

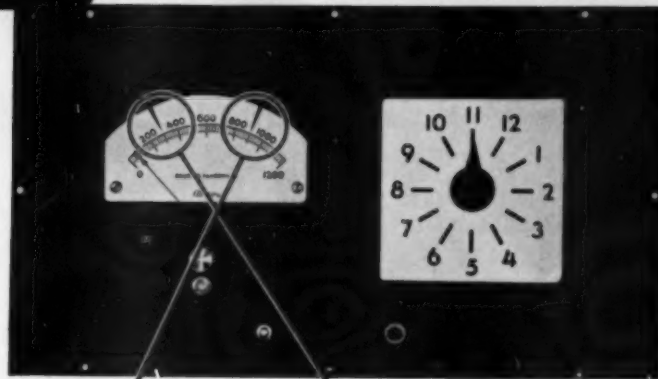
The Griscom-Russell Co., one of the largest exclusive manufacturers of heat transfer apparatus, have just completed a concise picture-book presentation of some of their many designs of heaters, coolers, condensers and heat exchangers for all types of liquids, vapors, and gases. The material in the bulletin is arranged in sections to show some of the various types of G-R apparatus which are of particular interest to the oil and gas industry, power plants, general industrial and chemical plants, and the marine industry. The illustrations include views of equipment and representative in-

stallations, each accompanied by a brief explanation of design features and applications. The bulletin provides an informative reference to the extensive line of G-R heat transfer apparatus, and copies can be obtained by addressing The Griscom-Russell Co., Massillon, Ohio, Department EE, and asking for the Progress issue of *G-R News*.

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.



PYROTAC AUTOMATIC PROTECTION



AGAINST *high AND low* EXHAUST TEMPERATURES

The surest way to check engine performance is through constant monitoring of exhaust temperatures. Alnor—pioneer in Diesel Pyrometry—now brings you the latest development in the field of Diesel instrumentation. It is the Type 4490 Pyrotac that provides automatic protection against damage due to *both* high and low exhaust temperatures.

The Pyrotac automatically reads every cylinder temperature in the engine every few seconds. When one temperature varies from the rest, the Pyrotac tells you which cylinder—and how much.

If temperatures continue to rise—or fall below pre-set standards, the Pyrotac will automatically sound an alarm, or shut down the engine—and the switch pointer will stop at position of offending cylinder.

Small or large, your Diesel demands the protection of Alnor Exhaust Pyrometers—a proved way to lower cost performance uninterrupted by "foreseeable" breakdowns. Write today for Pyrotac Bulletin 4703 and see how an Alnor engineered and equipped pyrometer installation will fill your needs.

Man
knows only
that which he can
measure

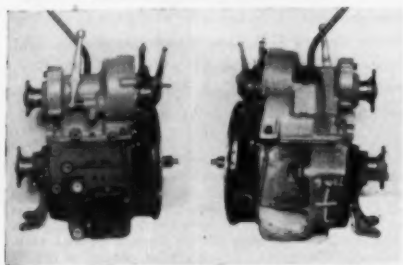


PRECISION INSTRUMENTS FOR EVERY INDUSTRY

ILLINOIS TESTING LABORATORIES, INC.
ROOM 508, 420 NO. LASALLE ST., CHICAGO 10, ILLINOIS

PYROMETERS • VELOMETERS • DEW POINTERS • PYROCONS • PYROLANCES • THERMO-ANEMOMETERS • CONTROLLERS

New Type of Power Take-Off



The Tangen Power Drive, a new type of power take-off unit, which was recently announced by Mobile Power, Inc. of Detroit, has been very well

received according to Charles F. Cummins, president. Sales have been made to manufacturers of fire fighting apparatus, road building machinery, mobile welding equipment, State Conservation Departments and other organizations. The Tangen Power Drive has certain design features which have proven to be of special interest to engineers of large truck manufacturers and has been listed in accessory catalogs of some of the manufacturers of trucks using Warner T-8, T-9, and New Process transmissions.

One of the special advantages claimed by Mobile Power, Inc. for its product is the patented design which makes it possible to mount this power take-off directly on top of the regular transmission in

the truck. No V-belts or pulleys are required. The installation is very simple and inexpensive. The power drive is capable of delivering 97% of the truck engine power that is transmitted direct from the main gear drive in the transmission. The speed of the power drive shaft is in direct relation to crankshaft speed regardless of the gear ratio being used in the transmission.

A specially designed Pierce Governor is another special feature which offers many unusual advantages for various applications. The governor, when required, becomes a part of the drive shaft, thus providing instant governor action, but does not affect the speed of the engine except when the power drive is in operation. Thus the vehicle is free to travel at any speed when the power drive is in neutral position. Much interest in the Tangen Drive has also been shown by distributing organizations and sales arrangements have been made both in the U. S. and Canada. Currently, however, Mobile Power, Inc., is expanding its sales and advertising program. For further information address: Mobile Power, Inc., 3020 East Grand Boulevard, Detroit 2, Michigan.

Duval Engine and Equipment Co.



Leonard A. Duval

Diesel engine users in and around Cleveland are rapidly becoming acquainted with an alert organization at 1310 Brookpark Road. Organized in 1948 to sell and service diesel, gas and gasoline engines, the Duval Engine and Equipment Co. has made rapid progress under the energetic direction of its president, Leon-

ard A. Duval, whose main objective is to provide the ultimate in service and solidly to support the engines they sell. Early this year the company moved into its new plant which is equipped throughout with modern servicing tools and a complete stock of replacement parts for many types of engines. Duval believes the first rule of good service is a clean shop and this rule is reflected in every department as well as by the fourteen or fifteen highly qualified personnel he has gathered around him. Duval soon learned, also, that the best source of prospects for the sale of new engines existed among owners of makes of engines other than those that he sells. Result is a well-rounded service set-up that is building an ever widening circle of friends and patrons.

Facilities provide for complete injection service; cleaning, reboring and relining, line boring bearings, painting—in fact, complete engine overhaul. Apparently the customers like what this wide-awake organization offers because only a few months after occupying the new plant the company announced plans for expansion doubling the floor space and quadrupling the capacity of the parts and service departments.

Names of the engine manufacturers represented by the Duval Co. include Nordberg Mfg. Co., Harnischfeger Corporation and International Harvester Co.



Dw-52 F

PURE gold was all that the old-time prospector sought. But successful mine owners today are equally alert for improved processes that will step up operating efficiency.

In that, they are like Diesel owners. A surprising number already are profiting by the use of PORUS-KROME* and VANDERLOY M.

The latter renews worn out crankshafts and cylinder liners to original dimensions. Yet it costs so little that PORUS-KROME is usually added.

PORUS-KROME is the process many Diesel operators specify as standard in new equipment. It has given them longer initial service than an unprocessed liner delivers from its new installation right on down through the last oversizing its working limit will allow.

If you're caught with some of these "ruined" items, VANDERLOY M will restore them and PORUS-KROME will multiply both their service life and operating efficiency.

Meanwhile, since both processes are always renewable when worn beyond standard dimensions, the cost of stocking and storing odd-sized parts will have gone the way of the old prospector and his burro.

Such prospects warrant your immediate inquiry.

★ ★ ★

*PORUS-KROME is a dense, hard, wear and corrosion-resistant chromium, produced by the Van der Horst Corporation of America, and which gives working surfaces an infinite number of tiny oil-retaining reservoirs for perfected lubrication.



VAN DER HORST CORPORATION OF AMERICA • OLEAN, N. Y.

U. S. PATENTS 2,048,578, 2,314,604 and 2,412,698

PORUS - KROME

Good for the Life of your Engines

VAN DER HORST

Inland River Reports

By DAVID I. DAY

THE NEWEST towboat of the U. S. Steel Company is virtually completed and ready to leave the yard of St. Louis Shipbuilding & Steel Co. This is the *C. F. Hood*, named in honor of Clifford F. Hood, executive vice-president of the corporation. The new boat has twin Fairbanks-Morse engines, 1280 hp., and a hull measuring 120x27x9 feet.

THE *Albert E. Heekin*, veteran towboat, now in the service of the Mississippi Valley Barge Line, is known to every port on the Ohio, Mississippi, and Illinois Rivers. Now she is making trips up the Cumberland. The *Heekin* was built by Dravo in 1941 and her Cooper-Bessemer twins, totaling 1000 hp., have done an almost unprecedented amount of work in a satisfactory manner.

ON OUR RECENT trip up the Ohio as far as Marietta we found the principal anticipation of rivermen was the early launching of the three new diesel vessels of the Jones & Laughlin Steel Corp., the first, called the *Aliquippa*, will be at work by Nov. 1. The others, called the *Fulcan* and the *Titan* will be at work by December 1 and Jan. 1, it is believed. They will all be 1370 hp. boats using twin Superior diesels. Evidently the J & L fleet will soon be all-diesel.

MAKING HER first appearance on the upper Ohio recently, the *Robin-E* of the Texas Towing Co., Houston, Texas, got a round of applause for her maneuverability and neat appearance. She was pushing crude oil. She was the first river boat to be built by Gulfport Shipbuilding & Dry Dock Corporation, at the Port Arthur, Texas, yards. She has one Enterprise engine, 1700 hp.

ANOTHER "deep South" pusher noted on the last trip up the Ohio was the *Dixie*, with four barges of ore from Brownsville, Texas, destination being Alloy, West Virginia. It was the first time we have seen her without her sister boat, *Dauntless*, and the first time with any but an oil or gasoline tow. The *Dixie* is a C. J. Dick fleet member and uses a 1320-hp. Superior engine.

OUR CONGRATULATIONS to the *LaCrosse Socony* for both power and speed. She was really moving up the Mississippi past Keokuk landing recently with 14,000 tons of gasoline and oil, headed for far upstream. This comparatively new boat has twin General Motors engines (Cleveland) with 3200 hp.

REPORTS ON THE new *Barry Dean*, 400 hp., single propeller, Caterpillar diesel engine indicate her early work trips to be very gratifying to her owners, the Rose Barge Line.

ANOTHER PRIVATE cruiser, name not distinguishable because of the rain, came rapidly up the Mississippi and was headed up the Missouri. The boat was bearing David Parker and some assistants, it was related in St. Louis. They are making plans for a Missouri River barge line, with two diesel vessels being built in Texas. More particulars later.

Improved Engine Compounding with DIAMOND ROLLER CHAINS



Reduced Weight, Fewer Shafts, and Longer Life Performance

● Where engine compounding has been carried on to the greatest extent—in the oil fields,—Diamond Roller Chain for years has demonstrated the value of its long-life dependable performance, high maintained efficiency and suitability to the job.

Flexibility is gained, weight kept to a minimum, space saved and installation simplified. With Diamond Drives, center distances can be selected to fit design demands, separating forces that effect bearing stresses are eliminated and load is shared by many chain pitches and sprocket teeth.

Diamond Chain engineers have had many years of experience in applying roller chains for all engine camshaft and pumping drives, power take-off and compounding applications. Practical recommendations are yours for the asking.

DIAMOND CHAIN COMPANY, Inc.

Dept. 407, 402 Kentucky Avenue, Indianapolis 7, Indiana

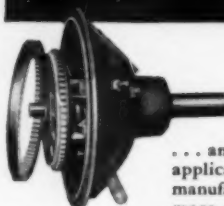
DIAMOND



ROLLER CHAINS



Cut Downtime... Step up Worktime



**More Friction
Power Take-Offs**
... in more sizes
... and in more fields
of application than any other
manufacturer. That's why
more and more manufac-

turers and users of powered equipment are
standardizing on Twin Disc Power Take-
Offs.

Standardization on Twin Disc drives is a
profit-making practice because it assures
you (1) long work life; (2) ready availabil-
ity of parts and services; (3) interchange-
ability of parts; (4) advantage of specialized
"know how" by repair departments; (5) min-
imum parts inventory requirements.

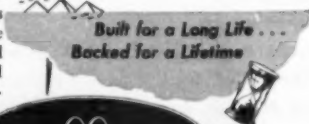
Increased manufacturing facilities
at Twin Disc assure you of quick deliv-
ery of both complete drive units
and replacement parts. Complete
parts stocks at 8 factory branches and
60 parts stations—which are staffed
by service experts—bring quick service
near to you.



68
8 Factory Branches
and 60 Parts Stations
strategically located.



**\$3 1/4
MILLION**
\$3 1/4 million of service parts
and complete replacement units
carried in inventory.



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin — HYDRAULIC DIVISION, Bensford, Illinois
BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TORONTO

Sales Manager



J. M. Suarez

The Snow-Nabstedt Gear Corporation has recently announced the appointment of Mr. J. M. Suarez as sales manager. Mr. Suarez with more than twenty years previous experience in foreign and domestic sales came to The Snow-Nabstedt Gear Corporation about ten years ago. He was elected to the board of directors in 1950. Known to the trade as "Joe," Mr. Suarez has made many friends in the marine industry since his association with The Snow-Nabstedt Gear Corporation.

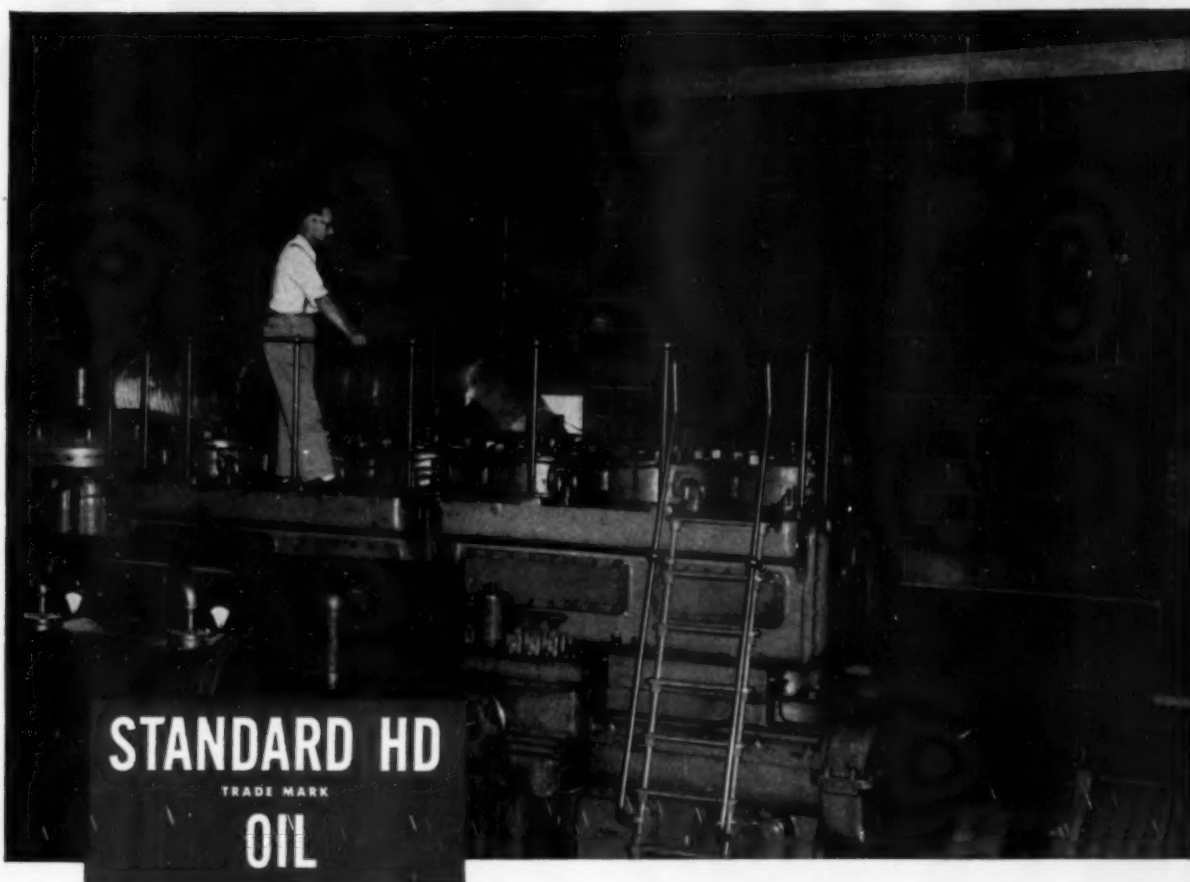
Norwegian Tanker



The motor tanker *Skjelbred* was recently launched by Burmeister & Wain in Norway. The vessel was contracted for by Skjelbreds Rederi A/S, Kristiansand, Norway. The vessel has a length of 465 ft. between perpendiculars, a moulded breadth of 62 ft. 10 1/4 in., a side height moulded to main deck of 34 ft. 8 in., and a dead weight of 13,250 tons. The capacity of its cargo tank is 632,000 cu. ft. and its speed on loaded trials 14 knots. The main engine is a Burmeister & Wain direct reversible, single-acting, two-stroke 6-cylinder cross-head engine with airless injection. The cylinder diameter is 740 mm., the length of stroke 1400 mm. The engine is capable of developing 5750 ihp., corresponding to about 4600 bhp. at 110 rpm. The auxiliary engine consists of one 3-cylinder, single-acting, four-stroke trunk piston engine with airless injection, direct coupled to a generator of 60 kw. at 110 volts and 540 rpm. The diesel has a bore of 200 mm. and a stroke of 300 mm.

Dura-Bond Appointments

Matt Korshin, sales manager of the Dura-Bond Engine Parts Company, Palo Alto, California, has announced the appointment of additional sales representatives. Frank J. Tarnacki, 231 Ashdale Ave., Syracuse, N. Y., is now representing Dura-Bond throughout New York State, with the exception of the metropolitan New York area. O. C. "Doc" Dunkin is now representing Dura-Bond in southern Ohio, western Pennsylvania and western West Virginia.



Doubles time between overhauls

• In the case of this 1028 HP diesel serving a midwestern municipal power station, excessive operating and maintenance costs were a serious problem . . . until a Standard Oil lubrication specialist recommended changing to STANDARD HD Oil and STANDARD Diesel Fuel.

Here's the situation today, in comparison with the results which plant operators were getting with a conventional lubricant:

Ring sticking, ring breakage, and car-

bon deposits have been eliminated.

Ring replacements have been reduced from 80 to 18 per year. Cylinder wear has been cut from .003" per 1000 hours to a maximum of .003" per 5000 hours.

Time between overhauls has been extended from 2500 hours to 6000 hours and longer.

Lubricant consumption, formerly averaging one gallon per 1192 KW generated, now averages one gallon per 1535 KW generated. Fuel con-

sumption, which had averaged 12.28 KW per gallon, now averages 13.50 KW per gallon.

A Standard Oil lubrication specialist can help you develop a similar "before and after" situation in the operation of your own diesels. For his services, and his recommendations, simply call the Standard Oil Company office in your own area. Or write:

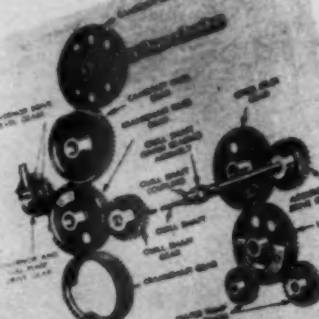
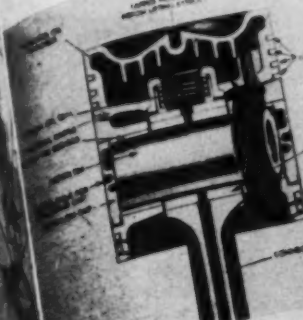
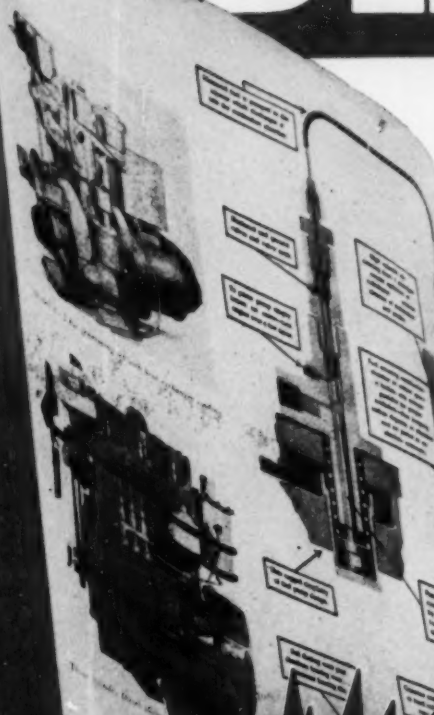
Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Illinois.

STANDARD OIL COMPANY



(Indiana)

DIESEL ENGINE



YOUR COPY

OF

VOLUME 17

HAS BEEN AVAILABLE

SINCE JUNE 14th

REVISED ANNUALLY.

This comprehensive book is brought up-to-date every year. Carefully revised and checked by the manufacturers themselves, its complete and profusely illustrated data include numerous changes, new types and models and re-designs with up-to-the-minute information on diesel and dual-fuel engines manufactured in this country.

Design and Consulting Engineers keep Diesel Engine Catalog at hand for easy reference throughout the year.

Product Engineers find its accurate, easy-to-find data of great value.

Engine operators use its wealth of factual information as an invaluable aid to good maintenance and service.

Technical Instructors and Students consult it as an unsurpassed reference book.

ENGINE CATALOG

ENGINES LISTED AND DESCRIBED IN VOLUME 17

Brush-Aboe
American Locomotive
Anderson O'Brien
Atlas Diesel Engine
Baldwin-Lima-Hamilton
Buda
Burmeister & Wain
Caterpillar
Chicago Pneumatic
Cleveland Diesel
Continental
Cooper-Bessemer
Crofton
Cummins
Deere
Detroit Diesel
Deutz

Electro-Motive
Enterprise
Fairbanks-Morse
Fulton
Graymarine
Hallett
Harnischfeger
Hercules
Hill
Ingersoll-Rand
International Ferment
International Harvester
Kahlenberg
Lathrop
Lister-Blackstone
Mack
Massey Harris
Murphy
Nordberg

Oliver
Rathbun-Jones
John Reiner
Sheppard
Sterling
Stewart & Stevenson
Superior
Union
Venn-Severin
Washington Diesel
Waukesha
White-Roth
Witte
Worthington

ENTIRELY REVISED AND REWRITTEN!

A MUST for design and operating ENGINEERS!

INDISPENSABLE for BUYERS!

INVALUABLE to INSTRUCTORS & STUDENTS!

IN NO OTHER BOOK can be found such complete and detailed information on diesel engines and accessories. Rewritten in its entirety while being brought up-to-date, great attention has been given to make Diesel Engine Catalog an easy-to-read book. Its comprehensive classification and indexing contribute to making any item easy-to-find.

FIVE BOOKS IN ONE HAVING FIVE INTEGRAL SECTIONS, this catalog is indispensable whether for technical reference or selective buying:

- (a) An engine section fully-illustrated with complete technical descriptions and specifications.
- (b) An accessory section describing engine and plant accessories.
- (c) A transmission section describing torque converters, etc.
- (d) A classified buyers' guide — "Market Place," covering Diesels, accessories, transmissions and other allied products.
- (e) A large advertising section. Manufacturers' advertisements carry a wealth of information for design and purchasing engineers.

**DON'T HAVE OBSOLETE INFORMATION IN YOUR TECHNICAL OR
PURCHASING LIBRARY!**

**MAKE SURE THE INFORMATION AT HAND IS ACCURATE AND
UP-TO-DATE!**

EVERY EDITION A SELL-OUT!

NEW EDITION — VOLUME SEVENTEEN — NOW READY TO MAIL

ORDER YOUR COPY NOW!

DIESEL PROGRESS

816 N. La Cienega Blvd., Los Angeles 46, Calif.

Enter my order today for a copy of the Diesel Engine Catalog, Volume Seventeen, Edited by Rex W. Wadman, for which I enclose \$10.00. (Copies may be ordered in the Sterling Areas by remitting £4:0:0 to DIESEL PROGRESS, St. Paul's Corner, Ludgate Hill, London, E.C.4.)

NAME.....

ADDRESS.....

CITY.....ZONE.....STATE.....

For **DEPENDABILITY** IN **TRANSPORTATION**



The Correct Fastener for the Job

These Erie bolts have at least one thing in common—they are designed to hold against maximum strains imposed by pressure, temperature, or corrosion. They differ in material, shape and threading as the job directs. For 38 years, we have goared our plant to manufacture these unusual high quality bolts to exacting specifications.

This broad experience backed by a high desire to be of service to you is your assurance that Erie is ready to meet your special bolting requirements.



ERIE BOLT and NUT CO.
ERIE • PENNSYLVANIA

STUDS • BOLTS • NUTS
ALLOYS • STAINLESS
CARBON • BRONZE

Representatives in Principal Cities.

Florida Diesel News

By ED DENNIS

AT BROOKVILLE, Camp Concrete Co. received from Cummins Diesel Engine of Florida, 2 Euclid trucks powered with model NHRS 600 Cummins diesels 300 hp. to supplement their 4 other Euclid trucks with 275 hp. Cummins, which have not needed an overhaul in 2½ years.

LENNY BOY of Pensacola, a 63 foot Florida type shrimp trawler being built at the Toche Boat Builders of Biloxi, Miss., powered with a D 337 Caterpillar 170 hp., Snow Nabstedt clutch, 4.4:1 reduction gears, keel cooling, 3000 gal. fuel tanks and 500 gal. water tank. Stribling Bros. of Gulfport, Miss., supplied the engines.

BAHAMA fishing boat, the *Sea Horse*, was re-powered with 2 Lathrop model D 50 4 cylinder diesels at the docks of Diesel Sales Co., Miami.

FLORIDA Georgia Tractor Co. delivered 2 TD 18 and 1 TD 24 International Harvester diesel tractors to C. T. Stockton Inc. for construction work.

OJUS; the *Mystryl*, a party fishing boat repowered with two 165 hp. G.M. 6-71's; thereby stepping up the horsepower from 104 to 330, installation was made at the boat slips of General Motors Diesel, Miami.

A NEW shrimper to Key West, *Mr. Sam*, built by the Nix Boat Works at St. Augustine, powered with a 110 G.M. 250 hp. diesel, a G.M. power take-off with Link Belt chain to a Stroudsburg hoist, Surrette batteries, Fulflo fuel filters and 3000 gal. fuel tanks. Capt. Bill Tood is the skipper; the diesel came from General Motors Diesel in Jacksonville.

BRANDARIO, a Dutch motor sailer, repowered with a model M 8500 Scripps diesel engine at the docks of Auto Marine Engineers of Miami.

SHRIMP trawler *Crescent L.T.D.* for Robert Lemmler of Biloxi, Miss., being built by the Toche Boat Builders, a 110 G.M. diesel 275 hp.; Twin Disc clutch and 4.5:1 reduction gears, has a 3600 gal. fuel tank and a 500 gal. water tank. Engine supplied by Kennedy Marine Engine Co., Biloxi, Miss.

SEABOARD Air Line R.R. has ordered 60 diesels. The new Seaboard diesel order totaling around \$9,000,000 will bring the railroad's ownership to 490 diesel units. Electro-Motive division of General Motors Corp. will build 30 units, American Locomotive 20, and Baldwin-Lima-Hamilton 10.

MERRILL-BALFE Division will handle sales and service for Murphy diesel engines for So. Florida, and Jacksonville Yacht Storage in No. Florida; both are divisions of Merrill Stevens Dry Dock Co., Jacksonville.

MANBOY, a 110x20 Key West shrimper, was re-powered with a D 337 Caterpillar 170 hp. and a Snow Nabstedt 4.4:1 reduction gear, by Shelly Tractor, Key West; A. E. Dowling is skipper and owner.

Practical Preventive Maintenance

A highly practical maintenance program to insure continuous and efficient operation of gas and diesel engines has been carefully developed by The Cooper-Bessemer Corporation, Mount Vernon, Ohio. Field experiences show this program to be superior to conventional methods for maintaining such equipment. Cooper-Bessemer's Preventive Maintenance Program is detailed in its two newest manuals. One manual covers gas-diesel and diesel engines; a second manual covers gas engines. In contrast to the usual periodic 8,000-hour overall check or the progressive-type maintenance schedule, Cooper-Bessemer's manuals show how to perform continuing checks on engines while in service to accurately forecast internal conditions of the engines and anticipate operational needs. The manuals can be obtained for \$2.00 a copy by writing H. T. Watson, The Cooper-Bessemer Corporation, Mount Vernon, Ohio.

Added to Chicago Field Staff

Charles R. Carmichael has been assigned to the Chicago sales office of Enterprise Engine & Machinery Company as a sales engineer. Mr. Carmichael spent three years in the Army Corps of Engineers in heavy-duty construction and administration. Following his Army service he returned to the University of California and graduated with a mechanical engineering degree. His work at Enterprise in development and test afford Mr. Carmichael an excellent background for diesel field work.

Moves to Larger Plant



Auto Marine Engineers Inc. moves to a new and larger plant. Plato Cox, president and founder of Auto Marine Engineers Inc. of Miami, announces their removal to a larger and more modern plant. The new location covers about 2½ acres and is situated on the Miami River with the Seaboard Railway tracks at its door. In this way it is more centrally located for all its customers. This well known firm handles sales, parts, and service for Hill, Scripps, Lister, Blackstone, Sterling, Superior and Fairbanks Morse diesel engines for South Florida, the Caribbean area and even as far south as Lima, Peru where they just shipped over 2500 tons of diesel engine equipment.

The new plant has over 15,000 sq. ft. of warehouse space plus a repair shop and when it is completed will have modern facilities for installing new engines at its new boat slips. Mr. Cox, a well known figure "south of the border," expects a larger volume of the diesel engine business from the lucrative Latin American trade.



Manzel
lubricates Worthington Diesel

What's Your Problem?

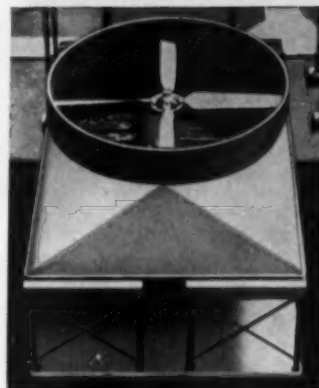
Insure many years of economical, trouble-free service from all types of machinery with Manzel Force Feed Lubrication. Adaptable to numerous difficult oiling problems, "Manzel's" can be engineered to *your* requirements. Experienced representatives throughout the country.

Just Write



275 BABCOCK ST., BUFFALO 10, N. Y.

Aeromaster FANS
CUT POWER COSTS
10%!



Aerodynamic design provides more cooling per horsepower

In every case where Koppers new Aeromaster Fans have been installed, power costs have gone down! Up to 10% less horsepower is required for Aeromaster . . . and that piles up power savings *fast!*

Koppers engineering makes this big difference between Aeromaster and ordinary industrial fans. Blade profiles are an adaptation of high-speed, top-efficiency aircraft propeller blades for higher safety factor and improved anti-flutter performance.

Aeromaster fans are available for any and every sizable industrial cooling application. Standard models range from 5 to 24 ft. dia., with 4, 6 or 8 blades per fan. Capacities up to 750,000 c.f.m. Engineering service furnished for special low pressure propeller fan installation. Sales engineers available in all principal U.S. cities, as well as in Europe.

KOPPERS COMPANY, INC.

	MAIL COUPON	
	TODAY for COMPLETE DETAILED INFORMATION	
<p>KOPPERS COMPANY, INC. Aeromaster Fans 728 Scott St., Baltimore 3, Md. Gentlemen: Please send me detailed information on Aeromaster Fans for</p>		
<p>(name and type of equipment to be cooled)</p>		
Name		
Title		
Company		
City Zone State		

NICAD

MADE IN U.S.A.

INSTALL NICKEL CADMIUM BATTERIES NOW

- Avoid frequent, costly battery replacement
- One-time battery investment
- Protect your plant against equipment shortages

Because the NICAD nickel cadmium storage battery requires less maintenance, you save precious man hours and, at the same time, are assured of reliable, fool-proof battery service through its long life.

NICAD batteries are supplied, in a range of capacities to important industrial fields, including:

MARINE

1. Engine Starting
2. Emergency Lighting
3. General Alarm, Radio, etc.

RAILROAD

1. Diesel Engine Starting
2. Signalling

UTILITIES

1. Stand-by Power
2. Switchgear Operation
3. Supervisory Control
4. Emergency Lighting

NICAD nickel cadmium batteries are also widely used in such fields as:

LABORATORIES RAPID TRANSIT
HEAVY AUTOMOTIVE

NICAD FEATURES



- Exceptionally Long Life
- Negligible Water Consumption
- Eliminates Gravity Records
- Uses Standard Charging Equipment
- Rugged Construction
- Low Internal Resistance

DETAILED BULLETINS AVAILABLE

NICAD

NICKEL CADMIUM BATTERY CORPORATION

100 Park Ave., New York 17, N. Y.

Factory—Easthampton, Mass.

Chicago Office—30 N. La Salle St.

MADE EXCLUSIVELY IN THE U.S.A.

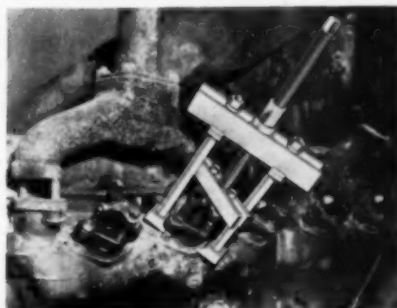
General Sales Manager



A. E. Traynor

A. E. Traynor, formerly credit manager of Champlin Refining Co., has been appointed general sales manager of the organization, according to an announcement by Joe N. Champlin, president. He has been identified with retail sales and the credit department of Champlin for twenty years. Glenn Smith, who was formerly credit manager in the station sales, has been moved up to credit manager of the retail and wholesale department. E. W. Smith, former general sales manager, will devote his full time to promoting the sale of tires, batteries and accessories. The Champlin Refining Company actively sells heavy duty diesel lubricants to the diesel trade.

OTC International Injection Nozzle Puller



The Owatonna Tool Company announces a new puller for removing the fuel injection nozzle from the cylinder head on all International Harvester diesel engines. This tool is fast and efficient, exerts a straight, powerful pull and does this otherwise difficult job in minutes where it used to take hours. The tool is adjustable and may be used for other pulling jobs as well. For complete information, refer to Puller No. HC-689 and ask your nearest OTC distributor, or write direct to the Owatonna Tool Company, 415 N. Cedar Street, Owatonna, Minnesota.

DIESEL ELECTRIC POWER for IMMEDIATE SHIPMENT

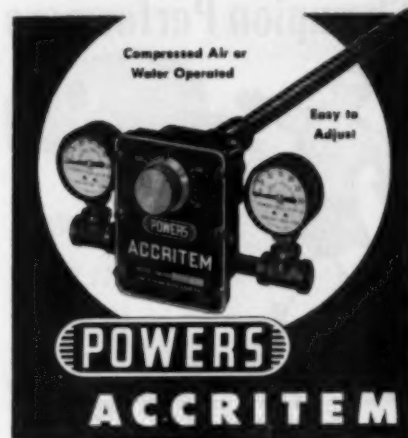
Unit Capacities
10 to 1875 Kva
A.C. 50-60
Cycles
Various
Voltages



Write or wire today for bulletins and complete information regarding these fine fully guaranteed, low cost DIESEL ENGINE GENERATING UNITS. Visit our plants at Sausalito (S. F.), California, and Jersey City, N. J., and see units in operation on our test stand.

"SPECIALISTS IN DIESEL POWER"

A. G. Schoonmaker Co., Inc.
54 Church St., New York 7, N. Y.



TEMPERATURE REGULATOR

For Jacket Water and Lube Oil Control

Unsurpassed for reliability and power to operate large or small size 3-way or 2-way diaphragm valves for accurate control of jacket water and lube oil cooling temperatures.

IMPORTANT ADVANTAGES

- Adjustable Sensitivity and over-heat protection.
- Calibrated Dial temperature adjustment.
- Simple, Rugged Construction withstands vibration and insures many years of reliable service.
- Temperature Ranges 50 to 250° F. and 150 to 350° F.
- Easy to Install Requires 15 lb. supply of compressed air or water for its operation.
- Small Size—regulator head is only 2 1/4" x 3 1/4", sensitive bulb is 12" long with 1/4" I.P.S. connection.

Write for Bulletin 316

Powers FLOWRITE Valve
controlled by a Powers ACCRITEM Regulator
makes an unbeatable combination for better
control and — Less Maintenance



You will get
**TOP Performance with
this Better Valve Top.**

Durable moulded neoprene diaphragm (1) has positive sealing head which provides increased sealing action with increasing control pressure. Efficient diaphragm form insures ample and constant operating power thru full travel. Piston Plate Assembly (2) has a free floating thrust plate which absorbs side thrust. Closely guided piston plate maintains stem in accurate alignment. (a61)

Gives Better Control

and Many
Years of
Dependable
Service

THE POWERS REGULATOR CO.

3411 Oakton Street, SKOKIE, ILL. • Offices in over 50 Cities
60 YEARS OF WATER TEMPERATURE CONTROL

Champion Performers



COLUMBIA A.C. AND D.C. GENERATORS

For the greatest exhibition of quality and service use performance proved Columbia A.C. and D.C. Generators. Available for coupled service, belt drive, single or two bearing.

A.C. Generators: 6 1/4 to 1000 KVA
D.C. Generators & Exciters: 2 to 300 KW

Write for descriptive literature.
Our engineers will be glad to review your requirements.

COLUMBIA ELECTRIC MFG. CO.
4557 HAMILTON AVE. • CLEVELAND 14, OHIO

NEW PETROMETER
FOR ALL TANKS
FOR ALL LIQUIDS
FOR ALL DEPTHS
FOR ALL DISTANCES
PETROMETER CORPORATION
8 STAR SQUARE LONG ISLAND CITY 2, N. Y.



THE LARGEST CRANKSHAFT GRINDING MACHINE IN THE WORLD USED IN AN INDEPENDENT REPAIR SHOP

NATIONAL WELDING & GRINDING CO. 2929 CANTON ST. DALLAS 1, TEXAS

West Coast Diesel News

By FRED M. BURT

FOR GASOLINE plant service in their Ropes field in West Texas, Honolulu Oil Co. has purchased a 660-hp. natural gas engine driven, Clark Bros.

TO REPLACE a gasoline engine in powering his 40 ft. dragnetter *Sal-Boy*, Sal Feranti of Santa Cruz, purchased a 165-hp. Graymarine diesel engine from Hall-Young Co., San Francisco.

IN CONVERTING his 76 ft. racing cutter *Endymion* to a motor-sailer, Donald Douglas (head of Douglas Aircraft Co.) installed a 4-cyl., 133-hp. General Motors diesel, also a 3-kw. Fairbanks-Morse light plant.

AUSTIN SHERMAN, president of Hallett Mfg. Co., on his return from a two-months trip calling on several dozen Hallett distributors in Central and South America reports that competition from European diesel manufacturers gets tougher, pricewise, not in quality, due to the exchange factor. Hallett sells diesels in this area for an extraordinary variety of uses: power for small factories, irrigation, marine, lighting, and others.

RECENTLY re-powered with a 165-hp. Graymarine diesel (from Hall-Young Co.) was the 45 ft. sportsfisher *Privateer*, owner Elwood Meadows, Berkeley.

FOR USE in the P.G.&E. Co., Kettleman field compressor station, a 1760-hp., 8-cyl., high-compression Clark Bros. natural gas engine driven compressor.

FOR USE on Folsom Dam construction (Calif.) recently placed in operation, a new, large, 4500-Series, Manitowoc drag-line, by Savin Construction Co.; powered with a 12-cyl. 400-hp. Cummins diesel.

INCREASING production 50% over that with the old power, a General Motors 275-hp. diesel engine was installed to drive a 60 inch and 54 inch head rig saw by The D & B Lumber Co., Cloverdale, Calif.

FOR THE INITIAL re-pressuring plant (later to be quadrupled in capacity) of The Long Beach Oil Development Co. (in the Long Beach Harbor Co. owned area of the Wilmington oil field), three 5-cyl. 550-hp. (14 inch x 14 inch cyl.) high-compression, direct-connected to natural gas engine power in an integral unit, Clark Bros. compressors.

THE COOK BROS. EQUIPMENT CO., well-known in Los Angeles as builders of a wide variety of standard model and special, gasoline-powered trucks, have just built their first diesel-powered Model C-12 truck tractor, powered with a 165-hp. Cummins diesel engine.

RECENTLY PUT into use at the Folsom Dam for earth-moving, 15 new Euclid, 20-ton, end dump trucks powered with 300-hp. Cummins diesels.

FOR Blue Diamond Corporation's 4500-ft. elevation gypsum mine (Blue Diamond, Nev.) mining and stripping operation, one of the first of the new 2 1/2-yd. Link-Belt shovels, powered by a 275-hp., supercharged Cummins diesel driving through an Allison torque converter.

THREE 133-HP. General Motors, radiator-cooled, diesel power units have been delivered to the Sutter Basin Corp., Woodland, Calif. for installation in their self-propelled bank-out wagons, used in rice harvesting; most likely the first ones diesel-propelled.

GENERAL MOTORS diesel installations by The Judson Steel Co., Emeryville, Calif.: (1) To re-power a 25-kw. generator set providing current for electric magnets, a 46-hp. engine; (2) Replacing a

CRANKSHAFT GRINDING SERVICE

- ★ HARD CHROMIUM PLATING SERVICE
- ★ IRON PLATING SERVICE
- ★ MAGNAFLUX SERVICE

Four machines giving range from the smallest up to crankshafts with stroke of 16" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts. Damaged journals restored to size by iron plating and hard chromium finish plating.

Established 1924 . . . 27 years experience grinding crankshafts

NEED A TRAINED DIESEL TRACTOR AND HEAVY EQUIPMENT MAN?

We have lists of trained Diesel, Tractor, and Heavy Equipment operators, service men, and mechanics available for employment throughout the country. If you have need of such a man we will be glad to furnish complete information without obligation to you. Write to

PLACEMENT DEPARTMENT
INTERSTATE TRAINING SERVICE
PORTLAND 13, OREGON

Insist on VELLUMOID for Quality
GASKETS AND SHEET PACKING
FOR OIL, WATER AND GASOLINE


**FOR
COMPLETE
PURIFICATION
OF USED OIL**

The Hoffman Oil Conditioner saves lube oil by removing solubles and insolubles—saves centrifuge maintenance costs. Capacities of 50 to 500 g.p.h. Write for Bulletin A-467 and A-468.

**U. S. HOFFMAN
MACHINERY CORPORATION**
FILTRATION DIVISION, 712 LAMSON ST., SYRACUSE 6, N. Y.

BEST for DIESELS! How are your Revs?

STICHT UNIVERSAL
HAND
TACHOMETERS
CENTRIFUGAL TYPE
5 RANGES IN
ONE INSTRUMENT
30-12,000 RPM
CATALOG 303: 30-12,000 RPM
FOR DETAILS WRITE
FOR BULLETIN
NO. 750.



HERMAN H. STICHT CO., INC.
27 PARK PLACE NEW YORK 7, N. Y.

**SURPLUS
OIL FILTER ELEMENTS**

AC — T-11 Fuel Elements
AC — T-35-N Fuel Elements
AC — S-15-N Lube Elements
FRAM — C-1126-PBT-4 Fuel

(This number replaces any of the Navy Standard 8"x3" Fuel Filter Elements.)

Write: **DIESEL PROGRESS, File 506**
Box 8458, Cole Station, Los Angeles 46, Calif.

**DURA-BOND'S
"FACTS ILLUSTRATED"**
All Round camshaft bearings vs. split and interlock types

SEND FOR FREE COPY

Conclusive proof that "all round" cam bearings are more profitable, give superior performance than split and interlock types. Mail coupon today.

DURA-BOND ENGINE PARTS CO.
725 Loma Verde Ave., Palo Alto, California
Send me "Facts Illustrated" and your cam bearing catalog.

Name.....
Street.....
City..... State.....

heavy-duty gasoline engine in a small Plymouth locomotive (hauling capacity 9 cars), an 85-hp. diesel with torque converter, to enable handling of up to 20 cars.

JUST INSTALLED by Arthur Harwood, Branscomb, Calif., in his new sawmill designed to cut 50,000 feet per day, a General Motors Twin Power diesel unit of 300 hp.

IN THE Pacific Northwest, many fishing boats 25-40 ft. in length, are being powered and re-powered with small, light weight, high speed Buda diesel engines instead of much higher horsepower gasoline engines. Included are—for Nick Novakovich—New gill net boat being built by Marine View Boat Building, Tacoma, Washington. Buda diesel 45-hp. at 2000-rpm.; Al Alexander, Sitka, Alaska—Re-power of the troller Sockeye with Buda, 57-hp. at 2000-rpm. Engines purchased from Seattle branch of the Buda Company.

Catalog Folder

Young Supercharger Air Intercoolers, designed for cooling compressed air between the supercharger blower and the air manifold leading to cylinders of engines—diesel, natural gas, dual fuel, etc.—are described in a new Catalog No. 1652, released recently by the Young Radiator Company, Racine, Wisconsin. The four-page, two-color catalog describes the two types of supercharging systems now in common use with 4-cycle engines—the low and high pressure systems. Supercharger air cooling is performed in a tube and fin cooler, where the hot air passes over the finned surface while the cooling water circulates through the tubes. The cooling fluid can be either fresh or sea water. Copies of the new Catalog No. 1652 are available by writing to the Young Radiator Company, Racine, Wis.

Diesels on The Railroads

The old puffing railroad steamers are rapidly being replaced by the sleeker, modern diesels. During the first five months of 1952, 1,149 new locomotives went into service on American roads. Only seven of this number were steamers. All the others were diesel driven.

**Highest Quality
Gasket & Oil Seals
by FITZGERALD**

**Gasket Craftsmen
for 46 Years**

Gaskets of all types and materials to give reliable service under all Diesel operating conditions.

For full information write—

**THE FITZGERALD MANUFACTURING
COMPANY**

TORRINGTON, CONN.

Branches: Chicago, Illinois; Los Angeles, Calif.
Canadian FITZGERALD, Limited, Toronto

**FITZGERALD
GASKETS**
SINCE 1906

For...

**CLEAN ENGINES
LOW FUEL COST**

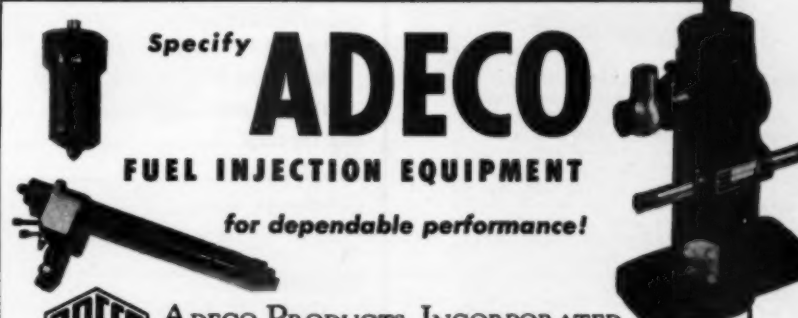
and

**Trouble-Free Operation
USE**

**SINCLAIR
GASCON OIL HD**

Sinclair Refining Company
600 Fifth Avenue, New York, N.Y.

Specify **ADECO**
FUEL INJECTION EQUIPMENT
for dependable performance!



ADECO PRODUCTS, INCORPORATED
Chicago 40, Illinois
MASTER CRAFTSMEN OF FINE FUEL INJECTION EQUIPMENT

TEMPERATURE CONTROL "AMOT"



Automatic temperature control for jacket water or lube oil for engines from 3 hp. to 5000 hp.

"Amot" thermostats will give your engines many years of dependable operation without any servicing or adjusting. Very reliable under conditions of extreme vibration.

Used for automatic temperature control on pipe line engines, electric power plants, marine engines, railroad engines, drag lines, and on all other engine applications.

Compare features and prices. Write for catalog on "Amot" thermostats.

AMERICAN MOTORS CO.

21 Nevin Ave.

Richmond 5, Calif., U.S.A.

For FUEL TRANSFER and HYDRAULIC GOVERNOR SERVICE



You Can
Depend on TUTHILL
Model L Pumps

Here is the pump that's known throughout the diesel industry for its dependable performance in fuel transfer and hydraulic governor service. Tuthill Model L is a positive displacement, internal gear rotary pump, mechanically sealed for quiet, leak-free operation and low power consumption. Capacities from .33 to 3 g.p.m. in wide pressure ranges. Available as either single or double-pump units. Write for Tuthill Model L Bulletin.



TUTHILL PUMP COMPANY

437 E. 93rd Street, Chicago 19, Illinois

ADVERTISERS' INDEX

Adeco Products, Inc.	79	Illinois Testing Laboratories, Inc.	67
Aerofin Corporation	76	International Harvester Co.	2
Air-Maze Corporation	17	Interstate Training Service	78
American Bosch Corporation	21	Kato Engineering Co.	53
American Motors Co.	80	Koppers Company, Inc., Aeromaster Fans	75
Atlantic Metal Hose Co., Inc.	55	Madison-Kipp Corp.	12
Briggs Filtration Company, The	76	Manzel	75
Brown & Sharpe Mfg. Co.	55	Merlin Engineering Co., Ltd., The	64
Buda Company, The	11	National Supply Co., The	9
Buffalo Forge Company	64	National Welding & Grinding Co.	78
C.A.V. Ltd.	62	Nickel Cadmium Battery Corp.	77
Cities Service Oil Co.	57	Nordberg Mfg. Co.	13
Cleveland Diesel Engine Div., General Motors Corp.	6	Petrometer Corp.	78
Columbia Electric Mfg. Co.	78	Powers Regulator Co., The	77
Cooper-Bessemer Corp.	Fourth Cover	Rockford Clutch Div., Borg-Warner	63
DeLaval Separator Co., The	15	Ross Heater & Mfg. Co., The	3
Delco-Remy Div., General Motors Corp.	4	Schoonmaker Co., A. G.	77
Diamond Chain Company, Inc.	69	Scaled Power Corporation	66
Dura-Bond Engine Parts Company	79	Sinclair Refining Co.	79
Electric Auto-Lite Company, The	51	Standard Oil Co. of California	7
Elliott Company	Third Cover	Standard Oil Co. (Indiana)	71
Eric Bolt & Nut Co.	74	Sterling Engine Co.	56
Eric Forge & Steel Corp.	14	Sticht Co., Herman H.	79
Federal-Mogul Corp.	19	Sturtevant Co., P. A.	76
Fitzgerald Manufacturing Co., The	79	Synchro-Start Products, Inc.	61
Fram Corporation	55	Texas Co., The	Second Cover-1
Gardner-Denver Company	8	Thomas Flexible Coupling Co.	59
General Motors Corp., Cleveland Diesel Engine Div.	6	Tide Water Associated Oil Co.	65
Delco-Remy Div.	4	Tuthill Pump Company	80
Harrison Radiator Div.	5	Twin Disc Clutch Co.	70
Gulf Oil Corp.	22	Union Diesel Engine Co.	54
Guth Company	76	U. S. Hoffman Machinery Corp.	79
Guth-Pascoc Company	18	Van Der Horst Corp. of America	68
Harrison Radiator Div., General Motors Corp.	5	Vellumoid Co., The	78
Honan-Crane Corp.	58	Westinghouse Electric Corp.	24
Hunt-Spiller Manufacturing Corp.	10	White-Roth Machine Corp.	16
		Winslow Engineering Co.	60
		Wix Cooler Co.	61

Here's built-in ruggedness!

ELLIOTT GENERATORS

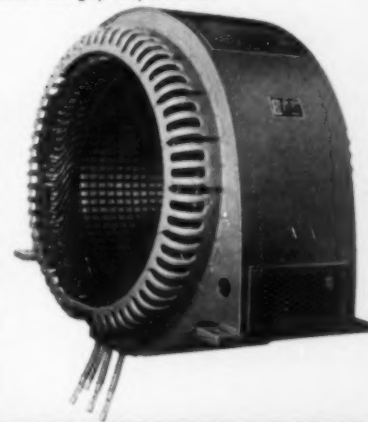
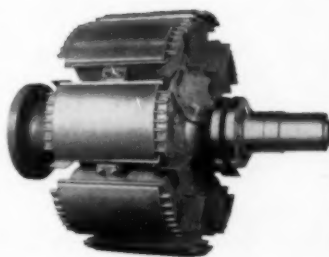
Synchronous
high-speed
75-5000 KVA



HERE IS THE crackproof toughness of fabricated steel plate in stator, bearing brackets or bearing pedestals, jig-machined where required to insure close accuracy, and engineered in their fabrication for the extreme rigidity that permits of closest air gap . . . Here is the lasting strength of compressed laminations, riveted, in stator spider — of silver brazing damper bars to end ring segments — of positive lashing of field coils . . . Here is enduring insulation that defies the toughest conditions . . . Here is thoroughly dependable electric power.

THE STATOR coils are lashed and blocked between turns, then sprayed with black, air-drying varnish, and two coats of clear marine varnish. Heavy steel frame end feet are welded to frame end plates, then face milled and drilled for dowels and bolts. Adjusting screws in the frame feet provide close vertical air gap adjustment.

THE SPIDER is pressed or shrunk on the shaft, and keyed. Poles with dovetail projections fit dovetail slots in spider, are wedged with opposing tapered wedges, which are tack-welded after overspeeding to insure ultimate tightness. Rigid, strong steel collector rings are shrunk on an insulated bushing pressed on the shaft. Field leads are clamped in place with cap screws and lock washers.



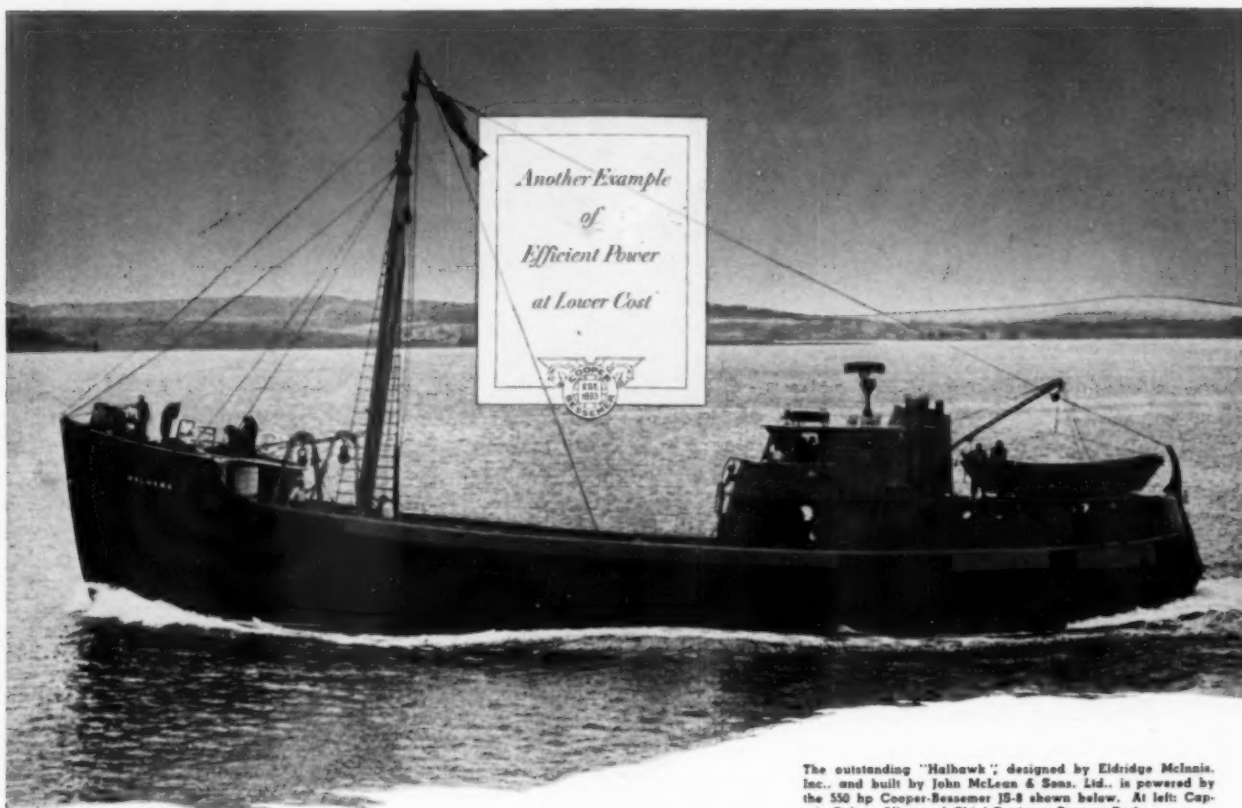
Full details on Elliott Synchronous Generators (High Speed) in Bulletin 782400-1. On request.

ELLIOTT Company

**Ridgway Division
RIDGWAY, PA.**

PLANTS AT: PHILADELPHIA, PA. - RIDGWAY, PA.
BRANCHES: NEW YORK, N. Y. - SPRINGFIELD, N. J. - NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES





The outstanding "Halhawk", designed by Eldridge McInnis, Inc., and built by John McLean & Sons, Ltd., is powered by the 550 hp Cooper-Bessemer JS-8 shown below. At left: Captain Robert Allen and Chief Engineer Stewart Parks.

ON THE FINE, NEW *"Halhawk"*... PROVED PERFORMANCE WINS A "BERTH"



Engine Room



Capt. Robert Allen



Chief Engineer
Stewart Parks

• Today many a fine fishing vessel in Nova Scotia waters is proving by performance that you just can't beat a modern Cooper-Bessemer diesel. That's one thing that influenced Halifax Fisheries, Ltd., in powering their new 117-foot "Halhawk"—rated as one of the finest draggers built in the Maritime Provinces.

The "Halhawk's" JS-8 is shown at left along with Captain Robert Allen and Chief Engineer Stewart Parks. These men, like so many others in fishing waters everywhere, will find in their Cooper-Bessemer diesel the availability and sure-fire response that cuts costs and avoids headaches . . . year after year.

The
Cooper-Bessemer
Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York, N. Y. Washington, D. C. Gloucester, Mass. San Francisco, Calif.
Houston, Texas Seattle, Wash. Los Angeles, Calif. Chicago, Illinois
St. Louis, Mo. Cooper-Bessemer of Canada, Ltd., Halifax, Nova Scotia
Calmes Engineering Co., New Orleans, Louisiana